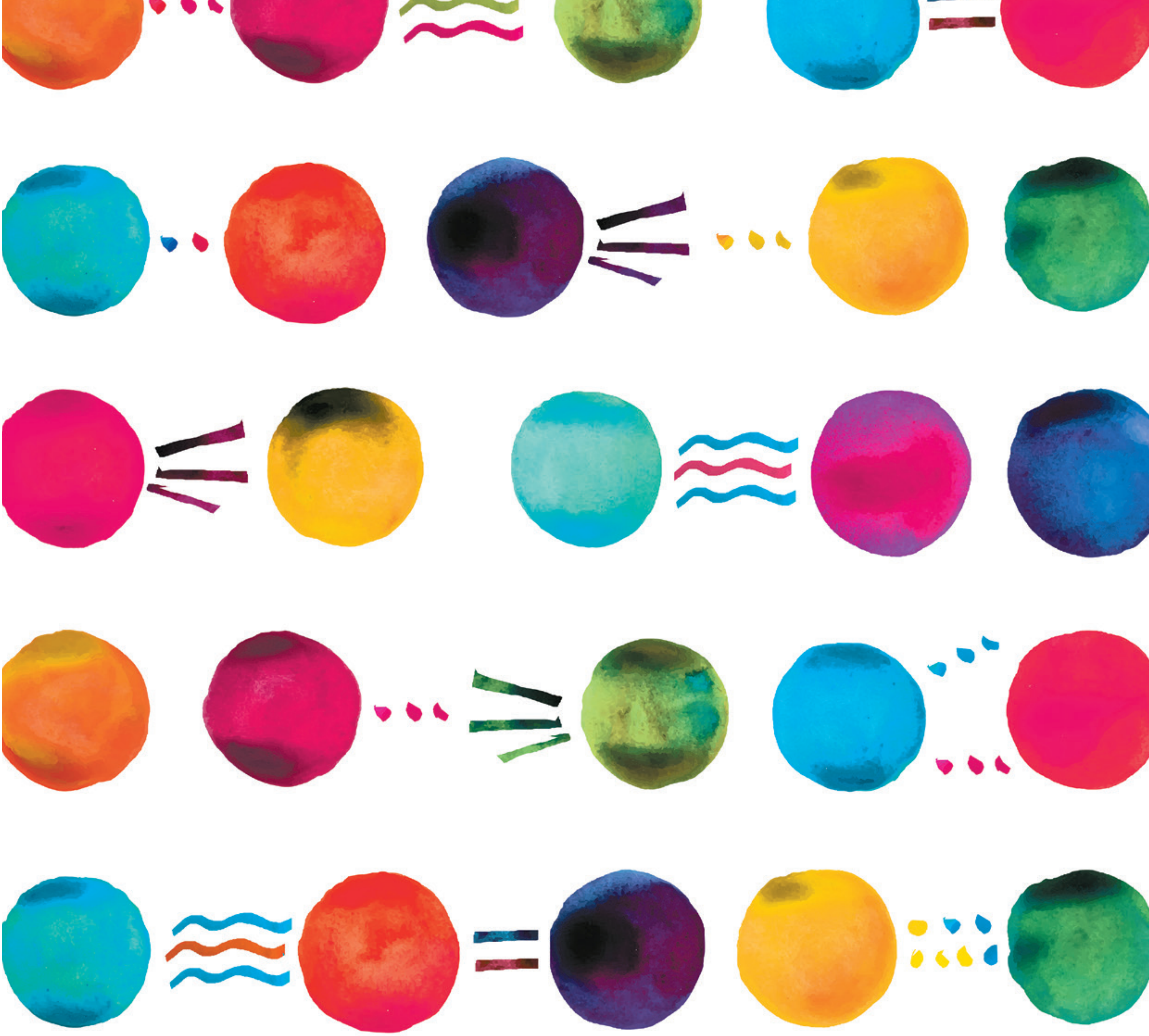

An Introduction to Language

AUSTRALIAN & NEW ZEALAND
10TH EDITION

Victoria Fromkin, Robert Rodman, Nina Hyams,
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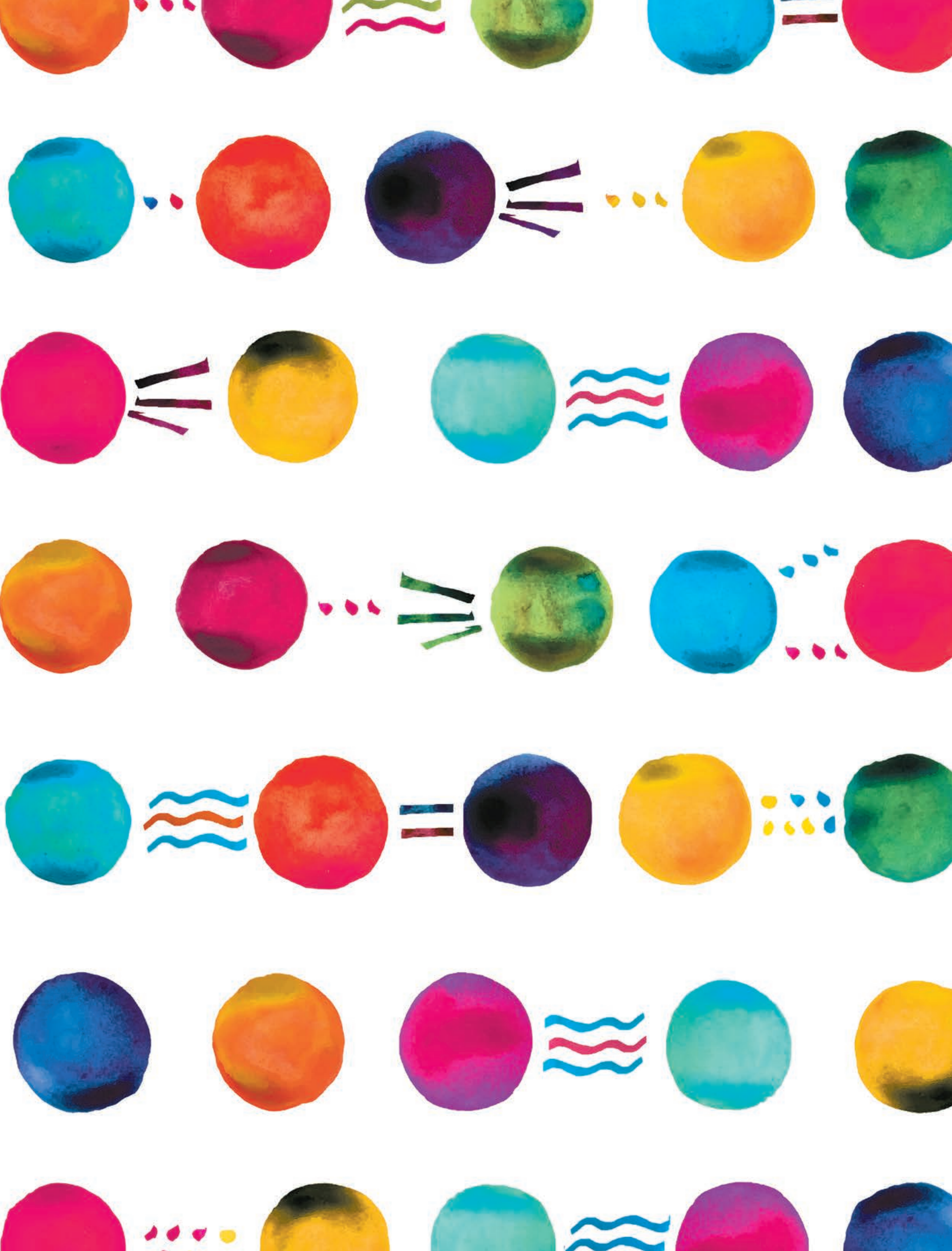

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An Introduction to Language: Australian and New Zealand 10th edition
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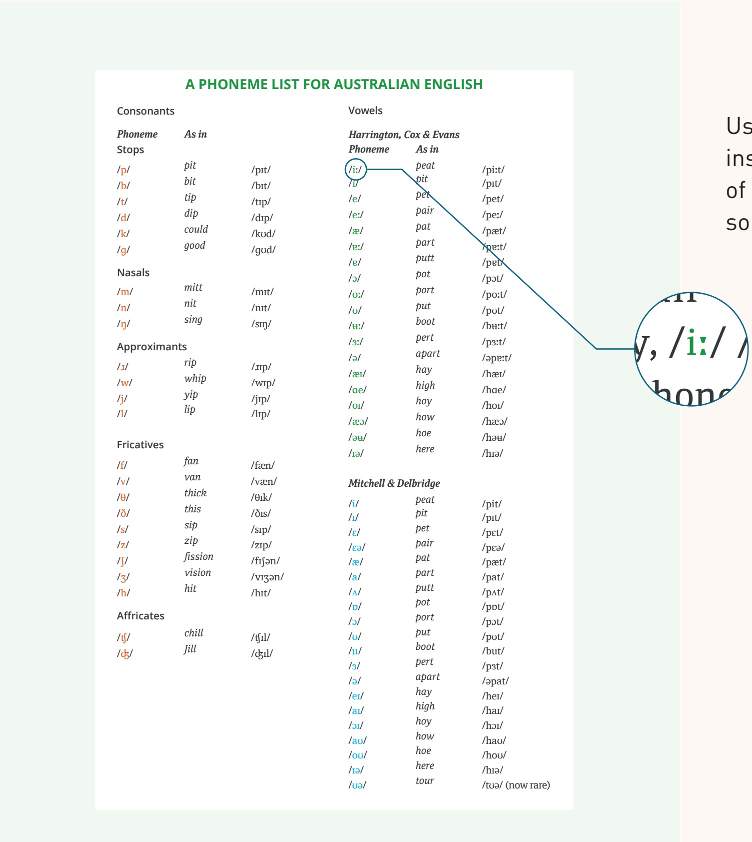
Brief contents

Contents

Guide to the text

As you read this text you will find a number of features in every chapter to enhance your study of linguistics and help you understand how the theory is applied in the real world.



A PHONEME LIST FOR AUSTRALIAN ENGLISH

Consonants

Phoneme	*As in*	
Stops		
/p/	*pit*	/pɪt/
/b/	*bit*	/bɪt/
/t/	*tip*	/tɪp/
/d/	*dip*	/dɪp/
/k/	*could*	/kʊd/
/g/	*good*	/gʊd/
Nasals		
/m/	*mitt*	/mɪt/
/n/	*nit*	/nɪt/
/ŋ/	*sing*	/sɪŋ/
Approximants		
/ɹ/	*rip*	/ɹɪp/
/w/	*whip*	/wɪp/
/j/	*yip*	/jɪp/
/l/	*lip*	/lɪp/
Fricatives		
/f/	*fan*	/fæn/
/v/	*van*	/væn/
/θ/	*thick*	/θɪk/
/ð/	*this*	/ðɪs/
/s/	*sip*	/sɪp/
/z/	*zip*	/zɪp/
/ʃ/	*fission*	/fɪʃən/
/ʒ/	*vision*	/vɪʒən/
/h/	*hit*	/hɪt/
Affricates		
/ʧ/	*chill*	/ʧɪl/
/ʤ/	*Jill*	/ʤɪl/

Vowels

Harrington, Cox & Evans

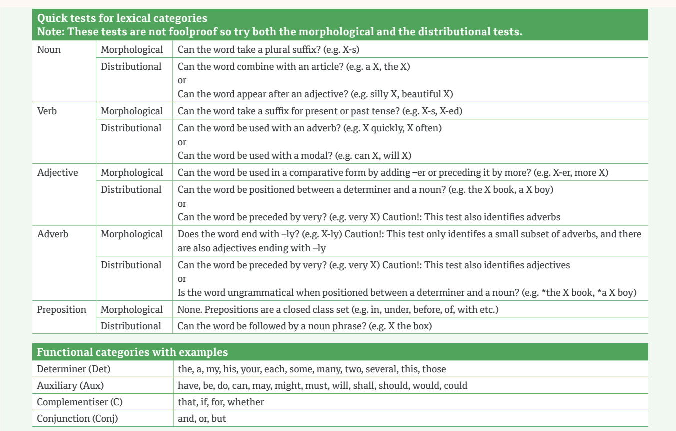
Phoneme	*As in*	
/iː/	*peat*	/piːt/
/ɪ/	*pit*	/pɪt/
/e/	*pet*	/pet/
/eː/	*pair*	/peː/
/æ/	*pat*	/pæt/
/ɐː/	*part*	/pɐːt/
/ɐ/	*putt*	/pɐt/
/ɔ/	*pot*	/pɔt/
/oː/	*port*	/poːt/
/ʊ/	*put*	/pʊt/
/ʉː/	*boot*	/bʉːt/
/ɜː/	*pert*	/pɜːt/
/ə/	*apart*	/əpɐːt/
/æɪ/	*hay*	/hæɪ/
/ɑe/	*high*	/hɑe/
/oɪ/	*hoy*	/hoɪ/
/æɔ/	*how*	/hæɔ/
/əʉ/	*hoe*	/həʉ/
/ɪə/	*here*	/hɪə/

Mitchell & Delbridge

/i/	*peat*	/pit/
/ɪ/	*pit*	/pɪt/
/ɛ/	*pet*	/pɛt/
/ɛə/	*pair*	/pɛə/
/æ/	*pat*	/pæt/
/a/	*part*	/pat/
/ʌ/	*putt*	/pʌt/
/ɒ/	*pot*	/pɒt/
/ɔ/	*port*	/pɔt/
/ʊ/	*put*	/pʊt/
/u/	*boot*	/but/
/ɜ/	*pert*	/pɜt/
/ə/	*apart*	/əpat/
/eɪ/	*hay*	/heɪ/
/aɪ/	*high*	/haɪ/
/ɔɪ/	*hoy*	/hɔɪ/
/aʊ/	*how*	/haʊ/
/oʊ/	*hoe*	/hoʊ/
/ɪə/	*here*	/hɪə/
/ʊə/	*tour*	/tʊə/ (now rare)

Use the **phoneme list for Australian English** inside the front cover as a quick reference list of the symbols that are used to represent the sounds of Australian English.

Find instances of these symbols throughout the text.



Quick tests for lexical categories
Note: These tests are not foolproof so try both the morphological and the distributional tests.

Noun	Morphological	Can the word take a plural suffix? (e.g. X-s)
	Distributional	Can the word combine with an article? (e.g. a X, the X) or Can the word appear after an adjective? (e.g. silly X, beautiful X)
Verb	Morphological	Can the word take a suffix for present or past tense? (e.g. X-s, X-ed)
	Distributional	Can the word be used with an adverb? (e.g. X quickly, X often) or Can the word be used with a modal? (e.g. can X, will X)
Adjective	Morphological	Can the word be used in a comparative form by adding –er or preceding it by more? (e.g. X-er, more X)
	Distributional	Can the word be positioned between a determiner and a noun? (e.g. the X book, a X boy) or Can the word be preceded by very? (e.g. very X) Caution!: This test also identifies adverbs
Adverb	Morphological	Does the word end with –ly? (e.g. X-ly) Caution!: This test only identifes a small subset of adverbs, and there are also adjectives ending with –ly
	Distributional	Can the word be preceded by very? (e.g. very X) Caution!: This test also identifies adjectives or Is the word ungrammatical when positioned between a determiner and a noun? (e.g. *the X book, *a X boy)
Preposition	Morphological	None. Prepositions are a closed class set (e.g. in, under, before, of, with etc.)
	Distributional	Can the word be followed by a noun phrase? (e.g. X the box)

Functional categories with examples

Determiner (Det)	the, a, my, his, your, each, some, many, two, several, this, those
Auxiliary (Aux)	have, be, do, can, may, might, must, will, shall, should, would, could
Complementiser (C)	that, if, for, whether
Conjunction (Conj)	and, or, but

Find useful summary tables while you learn about syntax including a quick guide to the various **lexical categories** inside the back cover.

PART-OPENING FEATURES

Part 2

Grammatical aspects of language

> The theory of grammar is concerned with the question: What is the nature of a person's knowledge of [their] language, the knowledge that enables [them] to make use of language in the normal, creative fashion? A person who knows a language has mastered a system of rules that assigns sound and meaning in a definite way for an infinite class of possible sentences.
>
> Noam Chomsky, *Language and Mind*, 1968

Refer to the **Chapter list** for an outline of the chapters in each part.

CHAPTER OPENING FEATURES

2 Phonetics: the sounds of language

> 7111 languages are spoken today. That number is constantly in flux, because we're learning more about the world's languages every day. And beyond that, the languages themselves are in flux. They're living and dynamic, spoken by communities whose lives are shaped by our rapidly changing world. This is a fragile time: Roughly 40 per cent of languages are now endangered, often with less than 1000 speakers remaining. Meanwhile, just 23 languages account for more than half the world's population.
>
> Ethnologue, https://www.ethnologue.com/guides/how-many-languages

Learning objectives

After reading Chapter 2, you should be able to:

- show an understanding that speech is produced through carefully coordinated overlapping vocal gestures that lead to disturbances in the air creating dynamic changes in acoustic energy
- demonstrate familiarity with the International Phonetic Alphabet (IPA) and its ability to represent the speech sounds of the world's languages, showing a particular understanding of the IPA symbols used to represent Australian English speech sounds
- categorise the consonant sounds of English according to the taxonomy determined by the International Phonetic Association and show an understanding of some additional consonantal features used across the world's languages
- describe the major features used to classify the vowels of the world's languages, with a focus on Australian English
- show how the phonetic features of length, pitch and loudness can be used in language to create the prosodic characteristics of rhythm, stress, intonation and tone

Authentic real-world and literary **quotes** provide insights and connect with the theory.

Identify the key concepts that the chapter will cover with the **Learning objectives** at the start of each chapter.

FEATURES WITHIN CHAPTERS

fundamental frequency In speech, the rate at which the vocal folds vibrate, symbolised as F0, called F-zero, perceived by the listener as **pitch**.

The sounds we produce can be described in terms of how fast the variations of air pressure occur, which determines the **fundamental frequency** of the sounds and is perceived by the hearer as pitch. We can also describe the magnitude, or **intensity**, of the variations, which determines the loudness of the sound. The quality of the speech sound – whether it is an [iː] or an [ɐː] or whatever – is determined by the shape of the vocal tract when air is flowing through it. This shape modulates the sound from the glottis into a spectrum of frequencies of greater or lesser intensity, and the particular combination of 'greater or lesser' is heard as a particular sound.

When you see **Key terms** marked in bold, study the **Definitions** nearby to learn important vocabulary. See the **Glossary** at the back of the book for a full list of key terms and definitions.

FEATURES WITHIN CHAPTERS

Key examples of linguistic rules and theory in practice are captured in **Worked examples**.

Worked example

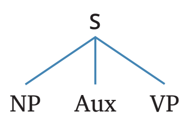
Planning in Active versus Passive Sentences

Nellie chased ***the ball***	**Active** The object of 'chase' is 'the ball.'
The ball was chased by Nellie	**Passive** The object of the active sentence 'the ball' becomes the subject NP in the passive sentence.

Worked example

Semantic rule I

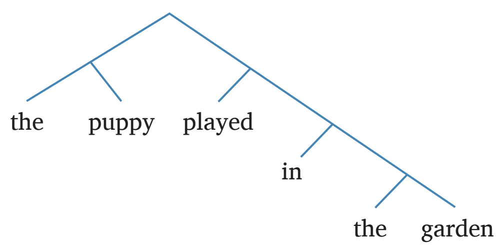
The meaning of:

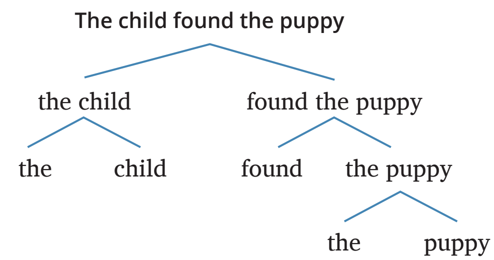


is the following truth condition:

> **If the meaning of NP (an individual) is a member of the meaning of VP (a set of individuals), then S is TRUE; otherwise it is FALSE.**

Other key elements are highlighted for simple navigation, including **Phrase structure trees** and **Constituency tests**





Constituency tests

What did the child find?
The puppy.
*Found the.

Constituency tests

Where did you find *the puppy*?
I found *him* in the park.

END-OF-CHAPTER FEATURES

At the end of each chapter you will find several tools to help you to review, practise and extend your knowledge of the key learning objectives.

CHAPTER REVIEW

Summary

Psycholinguistics is concerned with linguistic performance or processing, which is the use of linguistic knowledge (competence) in speech production and comprehension.

Comprehension, the process of understanding an utterance, requires the ability to access the mental lexicon to match the words in the utterance to their meanings. Comprehension begins with the perception of the acoustic speech signal. Listeners who know a language have the ability to segment the stream into linguistic units and to recognise acoustically distinct sounds as the same linguistic unit.

Psycholinguistic studies are aimed at uncovering the units, stages and processes involved in linguistic performance. Several experimental techniques, including lexical decision tasks, have proved helpful in understanding lexical access. The measurement of response times (RTs), shows that it takes longer to retrieve less common words than more common words, longer to retrieve possible non-words than impossible non-words, longer to retrieve words with larger phonological neighbourhoods than ones with smaller neighbourhoods, and longer to retrieve lexically ambiguous words than unambiguous ones. A word may prime another word if the

Review your understanding of the key chapter topics with the **Summary**.

Exercises

1 Speech errors (i.e. 'slips of the tongue' or 'bloopers') illustrate a difference between linguistic competence and performance since our very recognition of them as errors shows that we have knowledge of well-formed sentences. Furthermore, errors provide information about the grammar. The following utterances were actually observed. A few are attributed to Dr Spooner.
   a For each speech error, state what kind of linguistic unit or rule is involved, that is, whether it is phonological, morphological, syntactic, lexical or semantic.
   b State, to the best of your ability, the nature of the error or the mechanisms that produced it.
   (*Note*: The intended utterance is to the left of the arrow and the actual utterance is to the right.)
   Example: ad hoc ⟶ odd hack
   a phonological vowel segment
   b reversal or exchange of segments
   Example: she gave it away ⟶ she gived it away

Test your knowledge and consolidate your learning through the end-of-chapter **exercises**.

20 **Challenge exercise:** Do some independent research on one or more of the following topics:
   a Consider some of the high-tech methodologies used to investigate the brain discussed in this chapter, such as PET, MRI and MEG. What are the upsides and downsides of the use of these technologies on healthy patients? Consider the cost, the intrusiveness and the ethics of exploring a person's brain, weighed against the knowledge obtained from such studies.
   b Recent research suggests that specific language impairment may have a genetic basis. Conduct some research to find out what observations and experimental findings have led researchers to this conclusion. It may be helpful to investigate the websites of senior researchers in this area, such as Mabel Rice and

Extend your understanding with **challenge exercises**.

Further reading

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Smith, N V and Tsimpli, I M 1995, *The mind of a savant: Language*

NEW

Weblinks

- https://www.youtube.com/user/thelingspace – Fun short introductory videos on language acquisition, psycholinguistics and neurolinguistics.
- http://www.linguisticsociety.org/resource/neurolinguistics – You can learn about how our brains work, aphasia, dyslexia and stuttering.
- https://aphasia.org.au/about-aphasia – At this site you will find information about aphasia and useful
- http://psychology.about.com/od/historyofpsychology/a/genie.htm – Here you will learn more about Genie's case.
- http://criticalperiodhypothesis.blogspot.com/p/history-of-cph_21.html – This site introduces the history of the critical period hypothesis [CPH], research that support the existence of the CPH and research that failed to support the existence of the

Extend your understanding with the suggested **Further reading** and **Weblinks** relevant to each chapter.

Guide to the online resources

FOR THE INSTRUCTOR

Cengage is pleased to provide you with a selection of resources that will help you to prepare your lectures and assessments, when you choose this textbook for your course.

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- Interactive phoneme list for Australian English
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MindTap is a premium purchasable eLearning tool. Contact your Cengage learning consultant to find out how *MindTap* can transform your course.

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ANSWER KEY AND ADDITIONAL EXERCISE SOLUTIONS

The **answer key** provides instructors with suggested solutions to all the end-of-chapter exercises in the text. Solutions to the additional exercises are also provided.

COGNERO TEST BANK

A bank of questions has been developed in conjunction with the text for creating quizzes, tests and exams for your students. Create multiple test versions in an instant and deliver tests from your LMS, your classroom, or wherever you want using Cognero. Cognero test generator is a flexible online system that allows you to import, edit, and manipulate content from the text's test bank or elsewhere, including your own favourite test questions.

POWERPOINT™ PRESENTATIONS

Use the chapter-by-chapter PowerPoint slides to enhance your lecture presentations and handouts by reinforcing the key principles of linguistics.

ARTWORK FROM THE TEXT

Add the digital files of graphs, tables, pictures and flow charts into your course management system, use them in student handouts, or copy them into your lecture presentations.

INTERACTIVE PHONEME LIST FOR AUSTRALIAN ENGLISH

Listen to the sounds of Australian English with the **interactive phoneme list**, which includes both Harrington, Cox and Evans (HCE) and Mitchell and Delbridge (MD) vowel transcription systems. Each phoneme is captured in the locally recorded library of words spoken with an Australian English accent.

LEXICAL CATEGORY TEST TABLES

Download a copy of the summary tables located inside the back cover of the text for quick reference.

FOR THE STUDENT

MINDTAP

MindTap is the next-level online learning tool that helps you get better grades!

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STUDENT WEBSITE

Student Website for Fromkin's *An Introduction to Language* 10th edition

Resources on the Student Website are included with this text. This collection of bonus online tools includes:

- Interactive phoneme list for Australian English
- Lexical category test tables

Access the resources at https://fromkin.cengagelearning.com.au/

Preface

> Well, this bit which I am writing, called Introduction, is really the er-h'r'm of the book, and I have put it in, partly so as not to take you by surprise, and partly because I can't do without it now. There are some very clever writers who say that it is quite easy not to have an er-h'r'm, but I don't agree with them. I think it is much easier not to have all the rest of the book.
>
> A A Milne, *The Christopher Robin Birthday Book*

> The last thing we find in making a book is to know what we must put first.
>
> Blaise Pascal (1623–1662)

Interest in linguistics – the study of human language – has existed throughout history. Many of the questions discussed in this book have been asked for thousands of years. What is language? What do you know when you know a language? What is the origin of language? Is language unique to the human species? Why are there so many languages? Where do they come from? How are they related? How do children learn language? Are some languages (or dialects) superior to others? Are some languages simpler than others? What do all languages have in common? What is the neurological basis of human language? What parts of the brain are concerned with language? Can computers be taught to speak and understand human language? These are only a few of the questions that have piqued curiosity about language.

In addition to a philosophical interest in such questions, there are many other reasons that linguists, psychologists, philosophers, educators, sociologists, legal experts, neurologists, communication engineers and computer scientists need to understand the nature of human language. New developments in linguistics have wide ranging impact in education, health science, sociology, psychology, law, medicine, technology and communication.

In light of the importance of linguistics in so many diverse disciplines, the first nine (Australian) editions of this textbook were directed towards students in a wide variety of courses. The book has been used in linguistics and non-linguistics courses, at all levels from undergraduate to postgraduate, for students in fields as diverse as computer science, English, foreign languages, speech pathology, anthropology, communications and philosophy. The tenth Australian edition follows in this tradition, but further extends and updates the content to make it suitable for an even wider audience. Students will gain insight into current linguistic issues and develop a better understanding of debates appearing in the national media. We hope that this book will help to dispel certain common misconceptions that people have about language and language use.

We have provided many new exercises and problem sets in this edition so that students can apply their knowledge of linguistic concepts to novel data. This will help to consolidate learning and further test understanding of the material in the text. More research-oriented exercises have also been added for those instructors who wish their students to pursue certain topics more deeply. Some exercises are marked as 'challenge exercises' if they go beyond the scope of what is ordinarily expected in a first course in language study. An answer key is available to instructors to assist them in areas outside of their expertise. Chapter 1 continues to be a concise introduction to the general study of language. It includes many 'hooks' for engaging students in language study, including discussions of signed languages; a consideration of animal 'languages'; a treatment of language origins; and the occasional silliness of self-appointed mavens of 'good' grammar who beg us not to carelessly split infinitives and who find sentence-ending prepositions an abomination not to be put up with.

Chapter 2, on phonetics, introduces the notion of phoneme and allophone at the beginning of the chapter to set the scene for discussion of different levels of analysis. In this chapter the transcription system for Australian English, based firmly on the principles of the International Phonetic Alphabet is introduced. This system is essential for the study of Australian English speech patterns. The text fully adheres to the International Phonetics Association (IPA) notation conventions. The taxonomic classification system for describing the sounds of the worlds languages is introduced with particular reference to articulatory processes that are necessary to create individual speech sounds. Consonants, vowels, tone and intonation are illustrated through examples from a range of languages.

Chapter 3, on phonology, reinforces the concept of phoneme and allophone and highlights some important allophonic processes that occur in English. This chapter retains numerous Australian English and other language problems and examples to illustrate the important theoretical concepts relating to the patterns of sounds in language. Material in this chapter continues to be presented so that the student can appreciate the need for formal theories through real-world examples.

Chapter 4 launches the book into the study of grammar with morphology, the study of word formation, as that is the most familiar aspect of grammar to most students. The subject is treated with clarity and an abundance of simple illustrations from non-English languages to emphasise the universality of word structure, including the essentials of derivational versus inflectional morphology, free and bound morphemes, and the hierarchical structure of words. The section on compounds words has been expanded to include a detailed discussion of their internal structure.

Many instructors have noted that recent school English curricula include little teaching of grammar, and have requested that the text cover more foundational knowledge. Chapter 5 now has an expanded section on the various syntactic categories, and ways to identify parts of speech. In particular, we have expanded the section on how to identify different syntactic categories using constituency tests. Our feedback has shown that our students would benefit more from studying the basics of sentence structure than learning about current views on X-bar phrase structure. For this reason, we have not followed the US edition in moving to X-bar theory. Instead, we have chosen to introduce students to the more intuitive earlier system of phrase structure rules with ternary branching trees, leaving X-bar theory for more advanced courses on syntax. The text introduces students to phrase structure rules slowly and systematically, incorporating many example tree structures. While our focus is necessarily on the sentence structure of English, we have introduced cross-linguistic examples where possible. The intention in the syntax chapter is to enhance the student's understanding of the differences among languages as well as the universal aspects of grammar. Nevertheless, the introductory spirit of these chapters is not sacrificed, and students gain a deep understanding of word and phrase structure with a minimum of formalisms and a maximum of insightful examples and explanations, supplemented as always by quotes, poetry and humour.

Chapter 6, on semantics, has been more finely structured so that the challenging topics of this complex subject can be digested in smaller pieces. Still based on the theme of 'What do you know about meaning when you know a language?' the chapter first introduces students to truth-conditional semantics and the principle of compositionality. Following that are discussions of what happens when compositionality fails, as with idioms, metaphors and anomalous sentences. Lexical semantics takes up various approaches to word meaning, including the concepts of reference and sense, semantic features, argument structure and thematic roles. The most heavily revised parts of this chapter are the sections on argument structure, thematic roles and semantic features, the latter now containing a discussion of how these features affect the syntax. In the section on pragmatics, we discuss and illustrate in depth the influence of situational versus linguistic context on the communicative content of utterances, the significance of implicature in comprehension, Grice's maxims of conversation, presuppositions and J L Austin's speech acts.

The chapters comprising Part 3, `The psychology of language', have been revisited. Chapter 7, `Language acquisition', remains rich in data from English and other languages. The 10th edition incorporates a new section on the acquisition of Murrinhpatha, an Australian indigenous language spoken in the Northern Territory. Bilingualism and L2 acquisition are taken up in detail, including a section on L2 teaching. This edition includes both usage-based approaches to language acquisition as well as the generative approach. The arguments for innateness and Universal Grammar that language acquisition provides are, nevertheless, exploited to show the student how scientific theories of great import are discovered and supported through observation, experiment and reason. As in most chapters, Australian Sign Language (Auslan) is discussed, and its important role in understanding the biological foundations of language is emphasised.

In Chapter 8, 'Language processing and the human brain', the section on psycholinguistics has been revised to accommodate recent discoveries. This chapter may be read and appreciated without technical knowledge of linguistics. When the centrality of language to human nature is appreciated, students will be motivated to learn more about human language, and about linguistics, because they will be learning more about themselves. As in the previous edition, highly detailed illustrations of MRI and PET scans of the brain are included, and this chapter highlights some of the new results and tremendous progress in the study of neurolinguistics over the past few years. There is a section on how MEG (magnetoencephalography) can be used to study aspects of our linguistic knowledge. The arguments for the autonomy of language in the human brain are carefully crafted so that the student sees how experimental evidence is applied to support scientific theories.

Part 4 is concerned with language and society, including sociolinguistics and historical linguistics. Chapter 9 emphasises the important relationship between language and society and includes a focus on the concept of social dialect and style. Pidgins and creoles are discussed with greater reference to Aboriginal and Torres Strait Islander languages. The 'Language in use' section takes up slang, profanity, racial epithets, euphemisms and similar topics. Attitudes towards language and how they reflect the views and mores of society are also included in this chapter. We also discuss topics such as English spoken by non-native speakers and so-called standard languages. A section on language and sexism reflects a growing concern with this topic. An expanded list of references in this chapter is a valuable resource for further study.

Chapter 10, on language change, includes the latest research on language families, language relatedness and language typology. There is also a section 'Extinct and endangered languages', which reflects the intense interest in this critical subject. In response to reviewers' requests, a detailed and more complex illustration of the application of the comparative method to two contemporary dialects to reconstruct their ancestor – often called 'internal reconstruction' – is included in this chapter.

Chapter 11, on writing systems, has been updated with a discussion on emojis, adding a further dimension to what it means to write a language.

Key terms, which are bold in the text, are defined in the margin close to where they appear, as well as in the revised glossary at the end of the book. The glossary has been expanded and improved so that this edition provides students with a linguistic lexicon of nearly 550 terms, making the book a worthy reference volume.

This new Australian edition continues to reflect the study of linguistics in Australia by taking account of the place of language in Australian society and by basing its detailed description of English on the Australian English dialect. The phonemic symbols, for example, are those that are in standard use in this country, and the discussion of social and regional variation in Chapter 9 continues to focus on Australia and New Zealand. This book assumes no previous knowledge on the part of the reader. An updated list of references and list of weblinks at the end of each chapter are included to accommodate any reader who wishes to pursue a subject in more depth. Each chapter concludes with a summary and exercises to enhance the student's interest in, learning and comprehension of the textual material. We wish to thank the reviewers of this edition. We have benefited greatly from discussions with and suggestions from friends, colleagues, students, lecturers, tutors and reviewers of the last edition. If this text is better than the last, it is because of them. The responsibility for errors in fact or judgement is, of course, ours. We hope that the continual updates we make to the book improve its quality and the user experience. Finally, we wish to say thank you to the lecturers who have used the earlier editions; without them and their students there would be no new edition.

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Victoria Fromkin received her bachelor's degree in economics from the University of California, Berkeley, in 1944 and her MA and PhD. in linguistics from the University of California, Los Angeles, in 1963 and 1965, respectively. She was a member of the faculty of the UCLA Department of Linguistics from 1966 until her death in 2000, and served as its chair from 1972 to 1976. From 1979 to 1989 she served as the UCLA Graduate Dean and Vice Chancellor of Graduate Programs. She was a visiting professor at the Universities of Stockholm, Cambridge, and Oxford. Vicki served as president of the Linguistics Society of America in 1985, president of the Association of Graduate Schools in 1988, and chair of the Board of Governors of the Academy of Aphasia. She received the UCLA Distinguished Teaching Award and the Professional Achievement Award, and served as the US Delegate and a member of the Executive Committee of the International Permanent Committee of Linguistics (CIPL). She was an elected Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the New York Academy of Science, the American Psychological Society, and the Acoustical Society of America, and in 1996 was elected to membership in the National Academy of Sciences. She published more than one hundred books, monographs, and papers on topics concerned with phonetics, phonology, tone languages, African languages, speech errors, processing models, aphasia, and the brain/mind/language interface – all research areas in which she worked. Vicki Fromkin passed away on 19 January, 2000, at the age of 76.

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Part 1

The nature of human language

Reflecting on Noam Chomsky's ideas on the innateness of the fundamentals of grammar in the human mind, I saw that any innate features of the language capacity must be a set of biological structures, selected in the course of the evolution of the human brain.

S E Luria, *A Slot Machine, a Broken Test Tube, an Autobiography*, 1984

The nervous systems of all animals have a number of basic functions in common, most notably the control of movement and the analysis of sensation. What distinguishes the human brain is the variety of more specialized activities it is capable of learning. The pre-eminent example is language.

Norman Geschwind, *Specializations of the Human Brain*, 1979

Linguistics shares with other sciences a concern to be objective, systematic, consistent and explicit in its account of language. Like other sciences, it aims to collect data, test hypotheses, devise models and construct theories. Its subject matter, however, is unique: at one extreme it overlaps with such 'hard' sciences as physics and anatomy; at the other, it involves such traditional 'arts' subjects as philosophy and literary criticism. The field of linguistics includes both science and the humanities, and offers a breadth of coverage that, for many aspiring students of the subject, is the primary source of its appeal.

David Crystal, *The Cambridge Encyclopedia of Language*, 2010

1 What is language?

> When we study human language, we are approaching what some might call the 'human essence', the distinctive qualities of mind that are, so far as we know, unique to [humankind].
>
> Noam Chomsky, *Language and Mind*, 1972

Learning objectives

After reading Chapter 1, you should be able to:

- understand the arbitrary relation between linguistic form and meaning
- distinguish between linguistic knowledge (competence) and linguistic behaviour (performance)
- distinguish between descriptive and prescriptive rules of grammar
- understand the relationship between grammatical rules of individual languages and principles of language structure that may hold across all languages
- explain the difference between human language and the communicative systems of other animals.

Whatever else people do when they come together – whether they play, fight, make love or make cars – they talk. We live in a world of language. We talk to our friends, our associates, our wives and husbands, our lovers, our teachers, our parents, our rivals and even our enemies. We talk to bus drivers and total strangers. We talk face-to-face and over the telephone, and everyone responds with more talk. Television and radio further swell this torrent of words. Hardly a moment of our waking lives is free from words and even in our dreams we talk and are talked to. We also talk when there is no-one to answer. Some of us talk aloud in our sleep. We talk to our pets and sometimes to ourselves.

The possession of language, perhaps more than any other attribute, distinguishes humans from other animals. To understand our humanity, one must understand the nature of language that makes us human. According to the philosophy expressed in the myths and religions of many peoples, language is the source of human life and power. To some people of Africa, a newborn child is a *kintu*, a 'thing', not yet a *muntu*, a 'person'. Only by the act of learning language does the child become a human being. According to this tradition, then, we all become human because we all know at least one language. But what does it mean to know a language?

Linguistic knowledge

> Do we know only what we see, or do we see what we somehow already know?
>
> Cynthia Ozick, 'What Helen Keller Saw', *New Yorker*, 16 and 23 June 2003

When you know a language, you can speak and be understood by others who know that language. This means you are able to produce strings of sounds that signify certain meanings and to understand or interpret the sounds produced by others. But language is more than speech. Deaf people produce and understand **sign languages** just as hearing people produce and understand spoken languages. The languages of the deaf communities throughout the world are equivalent to spoken languages, differing only in their modality of expression.

sign language
A language used by deaf people in which linguistic units, such as morphemes and words as well as grammatical relations, are formed by manual and other body movements.

Almost everyone knows at least one language. Five-year-old children are nearly as proficient at speaking and understanding speech as their parents. Yet the ability to carry out the simplest conversation requires profound knowledge that most speakers are unaware of. This is true for speakers of all languages, from Albanian to Zulu. A speaker of English can produce a sentence that has two relative clauses without knowing what a relative clause is, such as:

My goddaughter, who was born in Sweden and who now lives in Australia, is named Disa, after a Viking queen.

In a parallel fashion, a child can walk without understanding or being able to explain the principles of balance and support or the neurophysiological control mechanisms that permit one to do so. The fact that we may know something unconsciously is not unique to language.

Knowledge of the sound system

Part of knowing a language means knowing what sounds (or **signs**)[1] are in that language and what sounds are not. One way this unconscious knowledge is revealed is by the way speakers of one language pronounce words from another language. If you speak only English, for example, you may substitute an English sound for a non-English sound when pronouncing words of another language, such as French *ménage à trois*. If you pronounce it as the French do, you are using sounds outside the English sound system.

sign
A single gesture (possibly with complex meaning) in the sign languages used by the deaf.

French people speaking English often pronounce words such as *this* and *that* as if they were spelt *zis* and *zat*. The English sound represented by the initial letters *th* in these words is not part of the French sound system, and the French pronunciation reveals the speaker's unconscious knowledge of this fact.

Knowing the sound system of a language includes more than knowing the inventory of sounds. It means also knowing which sounds may start a word, end a word and follow each other. The name of a former president of Ghana was *Nkrumah*, pronounced with an initial sound like the sound ending the English word *sing*. Although this is an English sound, no word in English begins with the *ng* sound. Speakers of English who have occasion to pronounce this name often mispronounce it (by Ghanaian standards) by inserting a short vowel sound, such as *Nekrumah* or *Enkrumah*. Similarly, the first name of the New Zealand mystery writer *Ngaio Marsh* is often mispronounced with an 'n' sound at the beginning instead of the 'ng' sound. Children who learn English recognise that *ng* does not begin a word, just as Ghanaian and Māori children learn that words in their language may begin with the *ng* sound.

We will learn more about sounds and sound systems in Chapters 2 and 3.

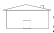
Knowledge of words

Knowing the sounds and sound patterns in our language constitutes only one part of our linguistic knowledge. Knowing a language means also knowing that certain sequences of sounds signify certain concepts or meanings. Speakers of English know what *boy* means, and that it means something different from *toy* or *girl* or *pterodactyl*. When you know a language, you know words in that language; that is, which sequences of sounds are related to specific meanings and which are not.

Arbitrary relation of form and meaning

> The minute I set eyes on an animal I know what it is. I don't have to reflect a moment; the right name comes out instantly. I seem to know just by the shape of the creature and the way it acts what animal it is. When the dodo came along he [Adam] thought it was a wildcat. But I saved him. I just spoke up in a quite natural way and said, 'Well, I do declare if there isn't the dodo!'
>
> Mark Twain, *Eve's Diary*, 1906

arbitrary
Describes the property of language, including sign language, whereby there is no natural or intrinsic relationship between the way a word is pronounced (or signed) and its meaning.

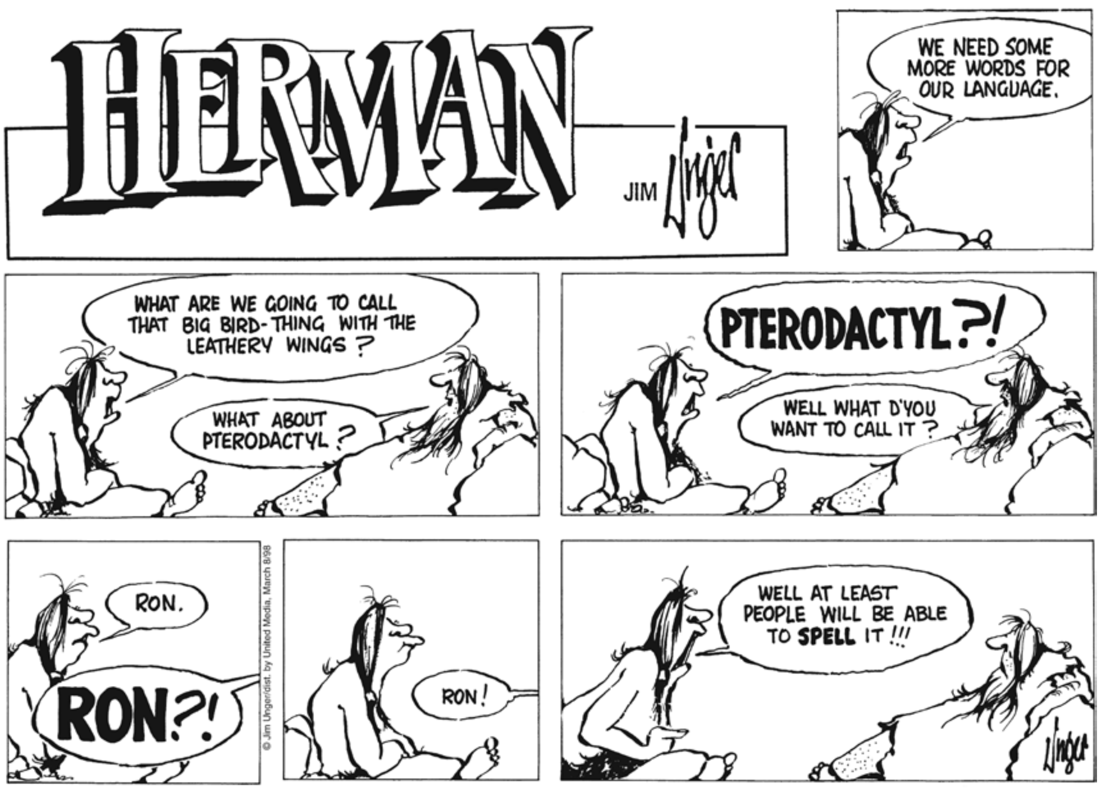
If you do not know a language, the words (and sentences) of that language will be mainly incomprehensible because the relationship between speech sounds and the meanings they represent in the languages of the world is, for the most part, an **arbitrary** one. When you are acquiring a language, you have to learn that the sounds represented by the letters *house* signify the concept ; if you know French, this same meaning is represented by *maison*; if you know Spanish, by *casa*, if you know Amharic, by *bet*. Similarly,  is represented by *hand* in English, *main* in French, *nsa* in Twi, and *ruka* in Russian. The same sequence of sounds can represent different meanings in different languages. The word *bolna* means 'speak' in Hindu-Urdu and 'aching' in Russian; *bis* means 'devil' in Ukrainian and 'twice' in Latin; a *pet* means 'a domestic animal' in English and 'a fart' in Catalan; and the sequence of sounds *taka* means 'hawk' in Japanese, 'fist' in Quechua, 'a small bird' in Zulu, and 'money' in Bengali.

These examples show that the words of a particular language have the meanings they do only by convention. This arbitrary relationship between form and meaning is shown in Figure 1.1, whereby a *pterodactyl* could have been called a *ron*, *blick* or *kerplunkity* and remained the same type of dinosaur.

As Juliet says in Shakespeare's *Romeo and Juliet*:

> What's in a name? That which we call a rose
> By any other name would smell as sweet.

Figure 1.1 **Form and meaning**



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This **conventional** and arbitrary relationship between **form** (sounds) and **meaning** (concept) of a word in spoken languages is also true of many signs in sign languages. If you see someone using a sign language you do not know, it is doubtful you will understand much of the message from the signs alone. A person who knows Chinese Sign Language (CSL) would find it difficult to understand Australian Sign Language (Auslan) and vice versa.

For some signs, the relationship between form and meaning was originally not arbitrary. The Auslan sign meaning 'tomorrow', for example, may have originated as a compound of signs meaning 'one' and 'sleep'. Over time this has changed, just as the pronunciation of words may change; now, the sign is formed by a 'one' handshape moving away from the cheek. These signs become conventional, so that the forms of the handshape, movement and location do not reveal the meaning any longer.

There is some **sound symbolism** in language; that is, words whose pronunciation suggests their meaning. Most languages contain **onomatopoeic** words, such as *buzz* or *murmur*, that imitate the sounds associated with the objects or actions they refer to. But even here the sounds differ from language to language, reflecting the particular sound system of the language. In English *cock-a-doodle-doo* is an onomatopoeic word whose meaning is 'the crow of a rooster', whereas in Finnish the rooster's crow is *kukkokiekuu*. Forget *gobble gobble* when you are in Istanbul; a turkey in Turkey goes *glu-glu*.

Sometimes particular sound sequences seem to relate to a particular concept. In English many words beginning with *gl* relate to sight, such as *glare*, *glint*, *gleam*, *glitter*, *glossy*, *glaze*, *glance*, *glimmer*, *glimpse* and *glisten*. However, such words are a very small part of any language, and *gl* may have nothing to do with 'sight' in another language or even in other words in English, such as *gladiator*, *glucose*, *glory*, *glutton*, *globe* and so on.

To know a language we must know words of that language. But no speaker knows all the entries in an unabridged dictionary, and even if someone did, he or she would still not know that language. Imagine trying to learn a foreign language by buying a dictionary and memorising words. No matter how many words you learnt, you would not be able to form the simplest phrases or sentences in the language, or understand a native speaker. No one speaks in isolated words. Of course, you could search in your tourist's dictionary for individual words to find out how to say something like 'car – petrol – where?' After many tries, a native speaker might understand this question and then point in the direction of a service station. If the speaker answered you with a sentence, however, you probably would not understand what was said; nor would you be able to look it up, because you would not know where one word ended and another began. Chapter 5 will explore how words are put together to form phrases and sentences, and Chapter 6 will explore word and sentence meanings.

The creativity of linguistic knowledge

> Albert: So are you saying that you were the best friend of the woman who was married to the man who represented your husband in divorce?
>
> André: In the history of speech, that sentence has never been uttered before.
>
> Neil Simon, *The Dinner Party*, 2000

Knowledge of a language enables you to combine sounds to form words, words to form phrases and phrases to form sentences. You cannot buy a dictionary of any language with all its sentences because no dictionary can list all the possible sentences. Knowing a language means being able to produce and understand new sentences never spoken before. This is the **creative aspect**, or **creativity of language**. Not every speaker of a language can create great literature, but everybody who knows a language can create and understand new sentences.

convention/conventional
The agreed-on, though generally arbitrary, relationship between the form and meaning of words.

form
The phonological or gestural representation of a morpheme or word.

meaning
The conceptual or semantic aspect of a sign or utterance that permits us to comprehend the message being conveyed. Expressions in language generally have both form – pronunciation or gesture – and meaning.

sound symbolism
The notion that certain sound combinations occur in semantically similar words, for example, *gl* in *gleam*, *glisten*, *glitter*, which all relate to vision.

onomatopoeia/onomatopoeic
Refers to words whose pronunciations suggest their meaning, e.g. *meow, buzz*.

creative aspect/creativity of language
Speakers' ability to combine the finite number of linguistic units of their language to produce and understand an infinite range of novel sentences.

In pointing out the creative aspect of language, Chomsky made a powerful argument against the behaviourist view of language that prevailed in the first half of the twentieth century, which held that language is a set of learnt responses to stimuli. While it is true that if someone steps on our toes we may automatically respond with a scream or a grunt, these sounds are not part of language. They are involuntary reactions to stimuli. After we automatically cry out, we can then go on to say, 'Thank you very much for stepping on my toe because I was afraid I had elephantiasis, but because I could feel it hurt I know I don't', or any one of an infinite number of sentences, because the particular sentence we produce is not controlled by a stimulus.

Even some involuntary cries, such as *ouch*, are constrained by our own language system, as are the filled pauses that are sprinkled through conversational speech, such as *er*, *uh* and *you know* in English. They contain only the sounds found in the language. French speakers, for example, often fill their pauses with the vowel sound that starts their word for 'egg' – *oeuf* – a sound that does not occur in English. Knowing a language includes knowing what sentences are appropriate in various situations. Saying 'Minced steak costs five dollars a kilo' after someone has just stepped on your toe would hardly be an appropriate response, although it would be possible.

Our creative ability is not only reflected in what we say, but also includes our understanding of new or novel sentences. Consider the following sentence: *Ben Hall decided to become a bushranger because he dreamed of pigeon-toed giraffes and cross-eyed elephants dancing in pink skirts and green berets on the wind-swept sands of the Nullarbor*. You may not believe the sentence, you may question its logic, but you can understand it, although you have probably never heard or read it before now.

Knowledge of a language, then, makes it possible to understand and produce new sentences. If you counted the number of sentences in this book that you have seen or heard before, the number would be small. Next time you write an essay or a letter, see how many of your sentences are new. Few sentences are stored in your brain, to be pulled out to fit some situation or matched with some sentence that you hear. Novel sentences never spoken or heard before cannot be stored in your memory.

Simple memorisation of all the possible sentences in a language is impossible in principle. If for every sentence in the language a longer sentence can be formed, then there is no limit to the length of any sentence and therefore no limit to the number of sentences. In English you can say:

This is the house.

or

This is the house that Jack built.

or

This is the malt that lay in the house that Jack built.

or

This is the dog that worried the cat that killed the rat that ate the malt that lay in the house that Jack built.

And you need not stop there. How long, then, is the longest sentence? A speaker of English can say:

The old man went.

or

The old, old, old, old, old man went.

How many 'olds' are too many? Seven? Twenty-three?

It is true that the longer these sentences become, the less likely we would be to hear or to say them. A sentence with 276 occurrences of 'old' would be highly unlikely in either speech or writing, even to describe Methuselah. But such a sentence is theoretically possible. If you know English, you have the knowledge to add any number of adjectives as modifiers to a noun and to form sentences with indefinite numbers of clauses, as in *the house that Jack built*.

All human languages permit their speakers to form indefinitely long sentences; creativity is a universal property of human language.

The fact of human linguistic creativity was well expressed more than 400 years ago by Huarte de San Juan (1530–1592):

> 'Normal human minds are such that ... without the help of anybody, they will produce 1000 (sentences) they never heard spoke of ... inventing and saying such things as they never heard from their masters, nor any mouth'.

Knowledge of sentences and non-sentences

> A person who knows a language has mastered a system of rules that assigns sound and meaning in a definite way for an infinite class of possible sentences.
>
> Noam Chomsky, *Language and Mind*, 1972

Our knowledge of language not only allows us to produce and understand an infinite number of well-formed (even if silly and illogical) sentences. It also permits us to distinguish well-formed (grammatical) from ill-formed (ungrammatical) sentences. This is further evidence of our linguistic creativity because ungrammatical sentences are typically novel, not sentences we have previously heard or produced, precisely because they are ungrammatical! Consider the following sentences:

1 a John kissed the little old lady who owned the shaggy dog.
b Who owned the shaggy dog John kissed the little old lady.
c John is difficult to love.
d It is difficult to love John.
e John is anxious to go.
f It is anxious to go John.
g John, who was a student, flunked his exams.
h Exams his flunked student a was who John.

If you were asked to put an asterisk before the examples that seemed ill formed or ungrammatical or no good to you, which ones would you choose? (The **asterisk** * is used before examples that speakers reject for any reason. This notation will be used throughout the book.) Our intuitive knowledge about what is or is not an allowable sentence in English leads us to put an asterisk before *b*, *f* and *h*. Which ones did you choose? Would you agree with the following judgements?

2 a What he did was climb a tree.
b *What he thought was want a sports car.
c Drink your beer and go home!
d *What are drinking and go home?
e I expect them to arrive a week from next Thursday.
f *I expect a week from next Thursday to arrive them.
g Linus lost his security blanket.
h *Lost Linus security blanket his.

If you find the sentences with asterisks unacceptable, as we do, you see that not every string of words constitutes a well-formed sentence in a language. Our knowledge of a language determines which strings of words are well-formed sentences, and which are not. Therefore, in addition to knowing the words of the language, linguistic knowledge includes rules for forming sentences and making the kinds of judgements you made about the examples in (1) and (2) above. These rules must be finite in length and finite in number so they can be stored in our finite brains.

asterisk
The symbol * used to indicate ungrammatical or anomalous examples; for example, **cried the baby*, **sincerity dances*; also used in historical and comparative linguistics to represent a reconstructed form.

Yet they must permit us to form and understand an infinite set of new sentences. They are not rules determined by a judge or a legislature, or even rules taught in a grammar class. They are unconscious rules that we acquire as young children as we develop language.

Returning to the question we posed at the beginning of this chapter – what does it mean to know a language? It means knowing the sounds and meanings of many, if not all, of the words of the language, and the rules for their combination – the grammar, which generates infinitely many possible sentences. We will have more to say about these rules of grammar in later chapters.

Linguistic knowledge and performance

linguistic competence The knowledge of a language represented by the mental grammar that accounts for speakers' linguistic ability and creativity. For the most part, linguistic competence is unconscious knowledge.

linguistic performance The use of linguistic competence in the production and comprehension of language; behaviour as distinguished from linguistic knowledge.

slip of the tongue (speech error) An involuntary deviation from an intended utterance that often results in ungrammaticality, nonsense words, anomaly, etc.

> 'What's one and one and one and one and one and one and one and one and one and one?' 'I don't know', said Alice. 'I lost count'. 'She can't do Addition', the Red Queen interrupted.
>
> Lewis Carroll, *Through the Looking-Glass*, 1871

Our linguistic knowledge permits us to form longer and longer sentences by joining sentences and phrases or adding modifiers to a noun. Whether we stop at three, five or eighteen adjectives, it is impossible to limit the number we could add if desired. Very long sentences are theoretically possible, but they are highly improbable. Evidently, there is a difference between having the knowledge necessary to produce sentences of a language and applying this knowledge. It is a difference between what we know – our **linguistic competence** – and how we use this knowledge in actual speech production and comprehension – our **linguistic performance**.

Speakers of all languages have the knowledge to understand or produce sentences of any length. However, there are physiological and psychological reasons that limit the number of adjectives, adverbs, clauses and so on that we actually produce and understand. Speakers may run out of breath, lose track of what they have said or die of old age before they are finished. Listeners may become confused, tired, bored or disgusted.

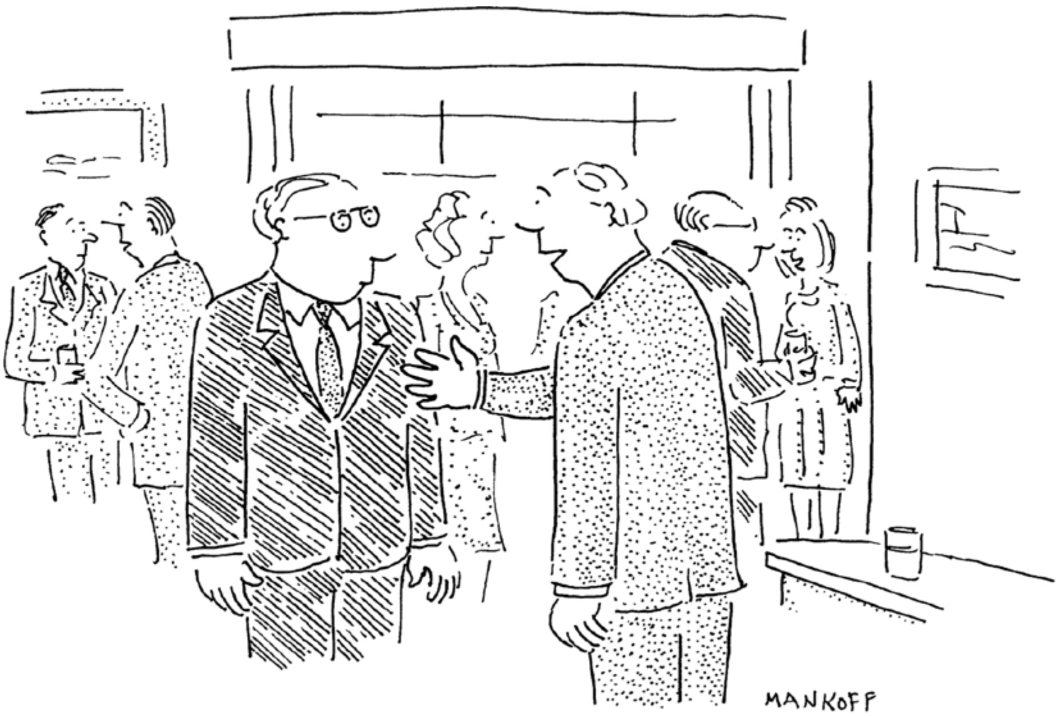
When we speak we usually wish to convey some message. At some stage during the act of producing speech, we must organise our thoughts into strings of words. Sometimes the message is garbled. We may stammer or pause or produce **slips of the tongue** (or **speech errors**), like saying 'preach seduction' when 'speech production' is meant (discussed in Chapters 3 and 8). We may even sound like the character in the cartoon below, who illustrates the difference between linguistic knowledge and the way we use that knowledge in performance.

For the most part, linguistic knowledge is not conscious knowledge. The linguistic system – the sounds, structures, meanings, words and rules for putting them all together – is acquired with no conscious awareness. Our ability to speak and understand, and to make judgements about the grammaticality of sentences, reveals our knowledge of the rules of our language. This knowledge represents a complex cognitive system. The nature of this system is what this book is all about. Figure 1.2 highlights the distinction between linguistic knowledge and linguistic performance.

What is grammar?

> We use the term 'grammar' with a systematic ambiguity. On the one hand, the term refers to the explicit theory constructed by the linguist and proposed as a description of the speaker's competence. On the other hand, it refers to this competence itself.
>
> Noam Chomsky and Morris Halle, *The Sound Pattern of English*, 1968

Figure 1.2 Linguistic knowledge versus linguistic performance



"Hi. I'm, I'm, I'm . . . You'll have to forgive me, I'm terrible with names."

CartoonStock/Robert Mankoff

Descriptive grammars

> There are no primitive languages. The great and abstract ideas of Christianity can be discussed even by the wretched Greenlanders.
>
> Johann Peter Suessmilch, in a paper delivered before the Prussian Academy, 1756

The way we are using the word **grammar** differs from most common usages. In our sense, the grammar includes the knowledge speakers have about the units and rules of their language – rules for combining sounds into words (called **phonology**), rules of word formation (called **morphology**), rules for combining words into phrases and phrases into sentences (called **syntax**) and rules for assigning meaning (called **semantics**). The grammar, together with a mental dictionary that lists the words of the language, represents our linguistic competence. To understand the nature of language, we must understand the nature of grammar and, in particular, the internalised, unconscious set of rules that is part of every grammar of every language.

Every human being who speaks a language knows its grammar. When linguists wish to describe a language, they attempt to describe the rules (the grammar) of the language that exist in the minds of its speakers. Some differences will exist among speakers, but there must be shared knowledge too. The shared knowledge – the common parts of the grammar – makes it possible to communicate through language. To the extent that the linguist's description is a true model of the speakers' linguistic capacity, it is a successful description of the grammar and of the language itself. Such a model is called a **descriptive grammar**. It does not tell you how you should speak; it describes your basic linguistic knowledge. It explains how it is possible for you to speak and understand and make judgements about well-formedness, and it tells what you know about the sounds, words, phrases and sentences of your language.

grammar
A linguistic description of a speaker's mental grammar; the mental representation of a speaker's linguistic competence; what a speaker knows about a language.

phonology
The sound system of a language; the component of a grammar that includes the inventory of sounds (phonemic units) and the processes required to ensure their appropriate combination and realisation, including aspects of rhythm, intonation and stress; the study of the sound systems of all languages.

morphology
The structure of words; the component of the grammar that includes the rules of word formation.

syntax
The rules of sentence formation; the component of the mental grammar that represents speakers' knowledge of the structure of phrases and sentences.

semantics
The study of the linguistic meaning of morphemes, words, phrases and sentences.

descriptive grammar
A linguist's description or model of the mental grammar, including the units, structures and rules; an explicit statement of what speakers know about their language.

mental grammar
The internalised grammar that a descriptive grammar attempts to model; see linguistic competence.

grammatical
Describes a well-formed sequence of words, one conforming to rules of syntax.

ungrammatical
Describes a structure that fails to conform to the rules of grammar.

dialect
A variety of a language whose grammar differs in systematic ways from other varieties. Differences may be lexical, phonological, syntactic and/or semantic.

Linguists use the word *grammar* in two ways: the first refers to the **mental grammar** speakers have in their brains; the second to the model or description of this internalised grammar studied by linguists. Almost 2000 years ago the Greek grammarian Dionysius Thrax defined grammar as that which permits us either to speak a language or to speak about a language. From now on we will not differentiate these two meanings because the linguist's descriptive grammar is an attempt at a formal statement (or theory) of the speaker's grammar.

When we say in later chapters that a sentence is **grammatical**, we mean that it conforms to the rules of the mental grammar (as described by the linguist); when we say that it is **ungrammatical**, we mean it deviates from the rules in some way. If, however, we posit a rule for English that does not agree with your intuitions as a speaker, then the grammar we are describing differs in some way from the mental grammar that represents your linguistic competence; that is, your language is not the one described. No language or variety of a language (called a **dialect**) is superior to any other in a linguistic sense. Every grammar is equally complex, logical and capable of producing an infinite set of sentences to express any thought. If something can be expressed in one language or one dialect, it can be expressed in any other language or dialect. It might involve different meanings and different words, but it can be expressed. We will have more to say about dialects in Chapter 9. This is true as well for languages of technologically underdeveloped cultures. The grammars of these languages are not primitive or ill formed in any way. They have all the richness and complexity of the grammars of languages spoken in technologically advanced cultures.

Prescriptive grammars

> It is certainly the business of a grammarian to find out, and not to make, the laws of a language.
>
> John Fell, *Essay Towards an English Grammar*, 1784

> Just read the sentence aloud, Amanda, and listen to how it sounds. If the sentence sounds OK, go with it. If not, rearrange the pieces. Then throw out the rule books and go to bed.
>
> James Kilpatrick, 'Writer's Art' (syndicated newspaper column), 1998

> Any fool can make a rule
> And every fool will mind it.
>
> Henry David Thoreau, journal entry, 1860

Not all grammarians, past or present, share the view that all grammars are equal. Language 'purists' of all ages believe that some versions of a language are better than others, that there are certain 'correct' forms that all educated people should use in speaking and writing, and that language change is corruption. The Greek Alexandrians in the first century, the Arabic scholars at Basra in the eighth century and numerous English grammarians of the eighteenth and nineteenth centuries held this view. They wished to *prescribe* rather than *describe* the rules of grammar, which gave rise to the writing of **prescriptive grammars**.

prescriptive grammar
Rules of grammar brought about by grammarians' attempts to legislate what grammatical rules for speakers should be, rather than what they are.

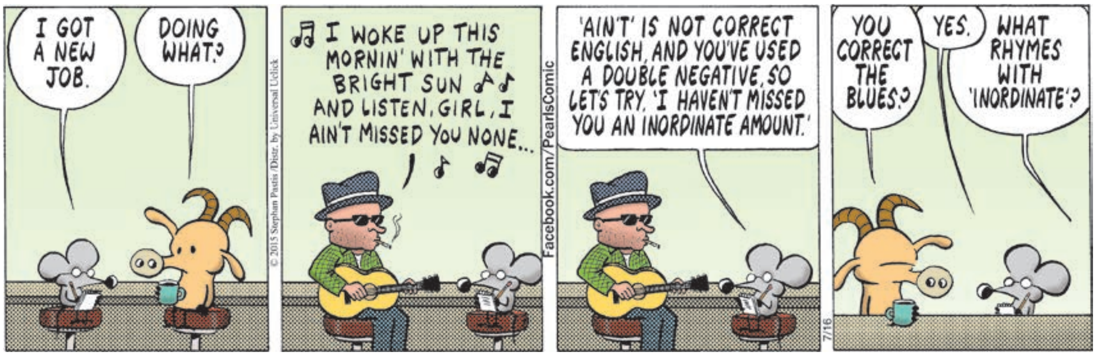
In the Renaissance a new middle class emerged who wanted their children to speak the dialect of the 'upper' classes. This desire led to the publication of many prescriptive grammars. In 1762 Bishop Robert Lowth wrote *A Short Introduction to English Grammar with Critical Notes*, in which he prescribed a number of new rules for English, many of which were influenced by his personal taste. Before the publication of his grammar, practically everyone – upper class, middle class and lower class – said 'I don't have none', 'You was wrong about that' and 'Matilda is fatter than me'. Lowth, however, decided that 'two negatives make a positive' and therefore one should say 'I don't have any', that even when *you* is singular it should be followed by the plural *were* and that *I* not *me*, *he* not *him*, *they* not *them* and so forth should follow *than* in comparative constructions.

Many of these prescriptive rules were based on Latin grammar, which had already given way to different rules in the languages that developed from Latin, such as Italian and French. Because Lowth was influential and because the rising new class wanted to speak 'properly', many of these new rules were legislated into English grammar, at least for the **prestige dialect** – that variety of the language spoken by people in positions of power.

prestige dialect
The dialect usually spoken by people in positions of power, and the one deemed correct by prescriptive grammarians; for example, RP (received pronunciation) (British) English, the dialect spoken by the British royal family.

Figure 1.3 highlights the distinction between prescriptive grammar and descriptive grammar, suggesting that double negatives are not 'correct English'.

Figure 1.3 Prescriptive grammar



The view that dialects that regularly use double negatives are inferior cannot be justified if one looks at the **standard dialects** of other languages in the world.

standard dialect
The dialect (regional or social) considered the norm.

Romance languages, for example, use double negatives, as the following examples from French and Italian show:

French:	Je	ne	veux	parler	avec	personne.
	I	not	want	speak	with	no-one.
Italian:	Non	voglio	parlare	con	nessuno.	
	not	I want	speak	with	no-one.	

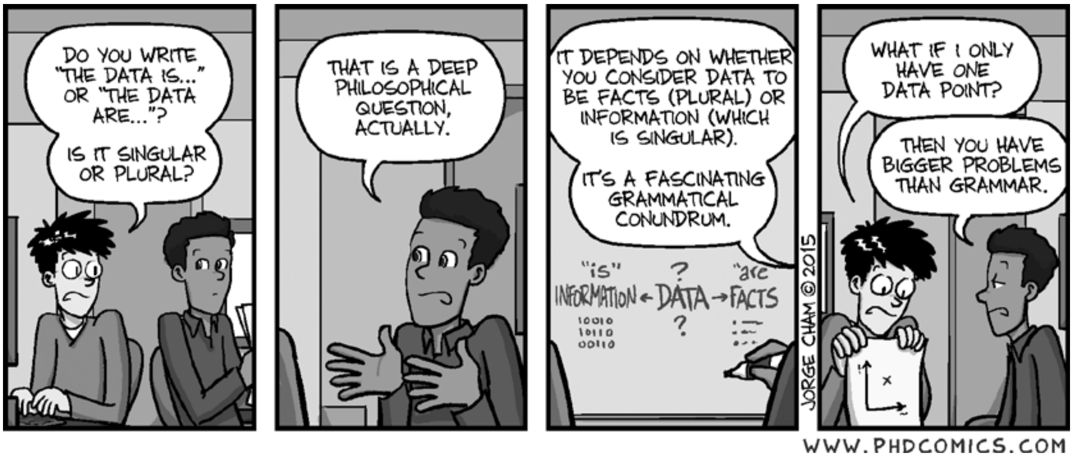
English translation: I don't want to speak with anyone.

Prescriptive grammars such as Lowth's are different from the descriptive grammars we have been discussing. Their goal is not to describe the rules people know, but to tell them what rules they should follow. British prime minister Winston Churchill had this to say about the 'rule' against ending a sentence with a preposition: 'That is a rule up with which I shall not put'.

Today our bookstores are filled with books by language purists attempting to 'save the English language'. Edwin Newman, for example, in his books *Strictly Speaking* and *A Civil Tongue*, rails against those who use the word *hopefully* to mean 'I hope', as in 'Hopefully, it will not rain tomorrow', instead of using it 'properly' to mean 'with hope'. What Newman fails to recognise is that language changes in the course of time and words change meaning, and the meaning of *hopefully* has been broadened for most English speakers to include both usages. Other saviours of the English language blame television, the schools and even the Australian Broadcasting Corporation for failing to preserve the standard language, and they mount attacks against those academics who suggest that non-standard varieties are perfectly proper in their context and effective for communication.

Figure 1.4 offers another example of the disjunction between prescriptive grammar and the actual use of language

Figure 1.4 Prescriptive grammar and actual use



'Piled Higher and Deeper' by Jorge Cham, http://www.phdcomics.com.

All human languages and dialects are fully expressive, complete and logical, as much as they were 200 or 2000 years ago. Hopefully, this book will convince you that all languages and dialects are rule-governed, whether spoken by rich or poor, powerful or weak, learned or illiterate. Grammars and usages of particular groups in society may be dominant for social and political reasons, but from a linguistic (scientific) point of view, they are neither superior nor inferior to the grammars and usages of less prestigious segments of society.

Having said all this, it is undeniable that the standard dialect may indeed be a better dialect for someone wishing to obtain a particular job or achieve a position of social prestige. In a society where 'linguistic profiling' is used to discriminate against speakers of a minority dialect, it may behove those speakers to learn the prestige dialect rather than wait for social change. But linguistically, prestige and standard dialects do not have superior grammars.

Finally, all of the preceding remarks apply to *spoken* language. Writing is another story (see Chapter 11). Writing is not acquired naturally through simple exposure to others speaking the language (see Chapter 7), it must be taught. And writing follows certain prescriptive rules of grammar, usage and style that the spoken language does not, and is subject to little dialectal variation.

Teaching grammars

> I don't want to talk grammar. I want to talk like a lady.
>
> Eliza Doolittle in George Bernard Shaw, *Pygmalion*, 1912

teaching grammar
A set of language rules written to help speakers learn a foreign language or a different dialect of their own language.

The descriptive grammar of a language attempts to describe the rules internalised by a speaker of that language. It is different from a **teaching grammar**, which is used to learn another language or dialect. Teaching grammars are used in schools to fulfil language requirements. They can be helpful to people who do not speak the standard or prestige dialect, but find it would be advantageous socially and economically to do so. Teaching grammars state explicitly the rules of the language, list the words and their pronunciations and aid the learning of a new language or dialect.

It is often difficult for adults to learn a second language without formal instruction, even when they have lived for an extended period in a country where the language is spoken. (Second-language acquisition is discussed in more detail in Chapter 7.) Teaching grammars assume the student already knows one language and compares the grammar of the target language with the grammar of their native language. The meaning of a word is given by providing a **gloss** – the parallel word in the student's native language. For example, with *maison*, 'house' in French, it is assumed the student knows the meaning of the gloss 'house', and so the meaning of the word *maison*.

gloss
A word in one language given to express the meaning of a word in another language; for example, 'house' is the English gloss for the French word *maison*.

Sounds of the target language that do not occur in the native language are often described by reference to known sounds. Therefore, the student might be aided in producing the French sound *u* in the word *tu* by instructions such as 'Round your lips while producing the vowel sound in *tea*'.

The rules on how to put words together to form grammatical sentences also refer to the learner's native-language knowledge. The teaching grammar *Learn Zulu* by Sibusiso Nyembezi, for example, states,

> 'The difference between singular and plural is not at the end of the word but at the beginning of it', and warns that 'Zulu does not have the indefinite and definite articles "a" and "the"'.

Such statements assume that students know the rules of their own grammar, in this case English. Although such grammars might be considered prescriptive in the sense that they attempt to teach the student what is or is not a grammatical construction in the new language, their aim is different from grammars that attempt to change the rules or usage of a language that is already known by the speaker.

This book is not primarily concerned with either prescriptive or teaching grammars, but these are considered in Chapter 9 in the discussion of standard and non-standard dialects.

Universal Grammar

> In a grammar there are parts that pertain to all languages; these components form what is called the general grammar. In addition to these general (universal) parts, there are those that belong only to one particular language; and these constitute the particular grammars of each language.
>
> César Chesneau Du Marsais, c. 1750

There are rules of particular languages, such as English, Swahili and Zulu, that form part of the individual grammars of these languages, and then there are rules that hold in all languages. Those rules representing the universal properties of all languages constitute a **Universal Grammar (UG)**. The linguist attempts to uncover the laws of particular languages and also the laws that pertain to all languages. The universal laws are of particular interest because they give us a window into the human 'faculty of language' which enables us to learn and use any particular language.

Universal Grammar (UG)
The principles and properties that pertain to the grammars of all human languages.

Interest in language universals has a long history. Early scholars encouraged research into the nature of language in general and promoted the idea of *general grammar* as distinct from *special grammar*. General grammar was to reveal those features common to all languages.

Students trying to learn Latin, Greek, French or Swahili as a second language are generally so focused on learning aspects of the new language that differ from their native language that they may be sceptical of the universal laws of language. Yet there are many things that all language learners know unconsciously even before they begin to learn a new language. They know that a language has its own set of sounds, perhaps thought of as its alphabet, that combine according to certain patterns to form words, and that the words themselves recombine to form phrases and sentences. The learner will expect to find verbs and nouns, as these are universal grammatical categories; they will know that the language – like all languages – has a way of negating, forming questions, issuing commands, and referring to past or future time; and more generally, they will understand that the language has a system of rules that will allow them to produce and understand an infinite number of sentences.

One way of thinking about UG is as the blueprint that all languages follow that forms part of the child's innate capacity for language learning. It specifies the different components of the grammar and their relations, how the different rules of these components are constructed, how they interact and so on.

The linguist's goal is to reveal the 'laws of human language', just as the physicist's goal is to reveal the 'laws of the physical universe'. The complexity of language undoubtedly means this goal will never be fully achieved. All scientific theories are incomplete and new hypotheses must be proposed to account for new data. Theories are continually changing as new discoveries are made. Just as physics was enlarged by Einstein's theories of relativity, so grows the linguistic theory of UG as new discoveries shed new light on the nature of human language. The comparative study of many different languages is of central importance to this enterprise.[2]

The development of grammar

> How comes it that human beings, whose contacts with the world are brief and personal and limited, are nevertheless able to know as much as they do know?
>
> Bertrand Russell, *Human Knowledge: Its Scope and Limits*, 1948

Linguistic theory is concerned not only with describing the knowledge that an adult speaker has of his or her language, but also with explaining how that knowledge is acquired.

All typically developing children acquire (at least one) language in a relatively short period with apparent ease. They do this despite the fact that parents and other caregivers do not provide them with any specific language instruction. Indeed, it is often remarked that children seem to 'pick up' a language just from hearing it spoken around them. Children are language-learning virtuosos – whether a child is male or female, from a rich family or a disadvantaged one, whether he or she grows up on a farm or in the city, attends day care or is home all day, none of these factors fundamentally affect the way language develops. Children can acquire any language they are exposed to – English, Dutch, French, Swahili, Japanese – with comparable ease and, even though each language has its own peculiar characteristics, children learn them all in very much the same way. For example, all children go through a babbling stage; their babbles gradually give way to words, which then combine to form simple sentences and then sentences of ever-increasing complexity. The same child who may be unable to tie her shoes or even count to five has managed to master the complex grammatical structures of her language and acquire a substantial **lexicon**.

lexicon
The component of the grammar containing a speaker's knowledge about morphemes and words; a speaker's mental dictionary.

How children accomplish this remarkable cognitive feat is a topic of intense interest to linguists. According to one hypothesis, the child's inexorable path to adult linguistic knowledge and the uniformity of the acquisition process point to a substantial innate component to language development. Children acquire language as quickly and effortlessly as they do because they do not have to figure out all the grammatical rules of language, but only those that are specific to their particular language. The universal properties – the laws of language – are part of their biological endowment. There are alternative views on language acquisition that assume little or no innate component specific to language. In Chapter 7 we will discuss language acquisition in more detail.

Sign languages: evidence for language universals

> It is not the want of organs that [prevents animals from making] … known their thoughts … for it is evident that magpies and parrots are able to utter words just like ourselves, and yet they cannot speak as we do, that is, so as to give evidence that they think of what they say. On the other hand, men who, being born deaf and mute … are destitute of the organs which serve the others for talking, are in the habit of themselves inventing certain signs by which they make themselves understood.
>
> René Descartes, *Discourse on Method and Meditation on First Philosophy*, 1637

The sign languages of deaf communities provide some of the best evidence to support the view that all languages are governed by the same universal principles. Current research on sign languages has been crucial to understanding the biological underpinnings of human language acquisition and use.

The major language of the deaf community in Australia is **Australian Sign Language** – known as **Auslan**. It has evolved mostly from British Sign Language (BSL), with some input from Irish Sign Language, both of which were brought to Australia during the nineteenth century.

Australian Sign Language (Auslan)
The sign language used by the deaf community in Australia; see also sign languages.

Auslan and other sign languages do not use sounds to express meanings. Instead, they are visual–gestural systems that use hand, body and facial gestures as the forms used to create vocabulary and to express grammatical rules. Sign languages are fully developed languages, and signers create and comprehend unlimited numbers of new sentences, just as speakers of spoken languages do. Signed languages have their own grammatical rules and a mental lexicon of signs, all encoded through a system of gestures, and are otherwise equivalent to spoken languages. Signers are affected by performance factors just as speakers are; slips of the hand occur similar to slips of the tongue. Finger fumblers amuse signers just as tongue twisters amuse speakers. These and other language games play on properties of the phonological (that is, 'sound') systems of the spoken and signed languages.

Deaf children who are exposed to signed languages acquire them just as hearing children acquire spoken languages, going through the same linguistic stages, including the babbling stage. Deaf children babble with their hands, just as hearing children babble with their vocal tracts. Neurological studies show that signed languages are organised in the brain in a very similar way to spoken languages, despite their visual modality. We discuss the brain basis of language in Chapter 8.

In short, signed languages resemble spoken languages in all major aspects. This universality is expected because, regardless of the modality in which it is expressed, language is a biologically based ability. Our knowledge, use and acquisition of language are not dependent on the ability to produce and hear sounds, but on a far more abstract cognitive capacity.

What is not (human) language

> It is a very remarkable fact that there are none so depraved and stupid, without even excepting idiots, that they cannot arrange different words together, forming of them a statement by which they make known their thoughts; while, on the other hand, there is no other animal, however perfect and fortunately circumstanced it may be, which can do the same.
>
> René Descartes, *Discourse on Method and Meditation on First Philosophy*, 1637

All languages share certain fundamental properties, and children naturally acquire these languages – whether they are spoken or signed. Both modalities are equally accessible to the child because human beings are designed for human language. But what of the 'languages' of other species – are they like human languages? Can other species be taught a human language?

The birds and the bees

> Teach me half the gladness
> That thy brain must know;
> Such harmonious madness
> From my lips would flow,
> The world should listen then, as I am listening now.
>
> Percy Bysshe Shelley (1792–1822), 'To a Skylark'

Most animal species possess some kind of communication system. Humans also communicate through systems other than language, such as head nodding or facial expressions. The question is whether the communication systems used by other species are at all like human language with its very specific properties, most notably its creative aspect.

Many species have a non-vocal system of communication. Among certain species of spiders there is a complex system for courtship. Before approaching his ladylove, the male spider goes through an elaborate series of gestures to tell her that he is indeed a spider and a suitable mate, and not a crumb or a fly to be eaten. These gestures are invariant. One never finds a creative spider changing or adding to the courtship ritual of his species.

A similar kind of gestural language is found among the fiddler crabs. There are 40 species and each uses its own claw-waving movement to signal to another member of its 'clan'. The timing, movement and posture of the body never change from one time to another or from one crab to another within the particular variety. Whatever the signal means, it is fixed – only one meaning can be conveyed.

discreteness

A fundamental property of human language in which larger linguistic units are perceived to be composed of smaller linguistic units, e.g. *cat* is perceived as the phonemes /k/, /æ/, /t/; *the cat* is perceived as *the* and *cat*.

An essential property of human language not shared by the communication systems of spiders, crabs and other animals is its **discreteness**. Human languages are not simply made up of a fixed set of invariant signs. They are composed of discrete units – sounds, words, phrases – that are combined according to the rules of the grammar of the language. The word *top* in English has a particular meaning, but it also has individual parts that can be rearranged to produce other meaningful sequences – *pot* or *opt*. Similarly, the phrase *the cat on the mat* means something different from *the mat on the cat*. We can arrange and rearrange the units of our language to form an infinite number of expressions. The creativity of human language depends on discreteness.

In contrast to crabs and spiders, birds communicate vocally and birdsongs have always captured the human imagination. Musicians and composers have been moved by these melodies, sometimes imitating them in their compositions, at other times incorporating birdsongs directly into the music. Birdsongs have also inspired poets, as in Shelley's 'To a Skylark', not to mention cartoonists.

bird call

One or more short notes that convey messages about the immediate environment, such as danger, feeding, nesting and flocking.

birdsong

A complex pattern of notes used by birds to mark their territory and to attract mates.

Birds do not sing for our pleasure, however. Their songs and calls communicate important information to other members of the species and sometimes to other animals. **Bird calls** (consisting of one or more short notes) convey danger, feeding, nesting, flocking and so on. **Birdsongs** (more complex patterns of notes) are used to stake out territory and to attract mates. Like the messages of crabs and spiders, however, there is no evidence of any internal structure to these songs; they cannot be segmented into discrete meaningful parts and rearranged to encode different messages as can the words, phrases and sentences of human language. In its territorial song, the European robin alternates between high-pitched and low-pitched notes to indicate how strongly it feels about defending its territory. The different alternations indicate intensity and nothing more. The robin is creative in its ability to sing the same song in different ways, but not creative in its ability to use the same units of the system to express different messages with different meanings. Recently, scientists have observed that finches will react when the units of a familiar song are rearranged. It is unclear, however, whether the birds recognise a violation of the rules of the song or are just responding to a pattern change.

Though crucial to the birds' survival, the messages conveyed by these songs and calls are limited, relating only to a bird's immediate environment and needs. Human language is different, of course. Our words and sentences are not simply responses to internal and external stimuli. If you are tired you may yawn, but you may also say 'I'm tired', or 'I'm going to bed', or 'I'm going to a cafe for a double espresso'. Notably, you also have the right to remain silent, or talk about things completely unrelated to your physical state – the weather, the movie you saw last night, your plans for the weekend, or most interesting of all, your linguistics class.

displacement

The capacity to talk (or sign) messages that are unrelated to here and now.

The linguists call this property of human language **displacement**: the capacity to talk (or sign) messages that are unrelated to here and now. Displacement and discreteness are two fundamental properties that distinguish human language from the communication systems of birds and other animals.

One respect in which birdsongs do resemble human languages is in their development. In many bird species the full adult version of the birdsong is acquired in several stages, as it is for children acquiring language. The young bird sings a simplified version of the song shortly after hatching and then learns the more detailed, complex version by hearing adults sing. However, it must hear the adult song during a specific fixed period after birth – the period differs from species to species – otherwise song acquisition does not occur. For example, the chaffinch is unable to learn the more detailed song elements after 10 months of age. A baby nightingale in captivity may be trained to sing melodiously by another nightingale, a 'teaching bird', but only before its tail feathers are grown. These birds show a critical period for acquiring their 'language' similar to the critical period for human language acquisition, which we will discuss in Chapter 7. As with human language acquisition, the development of the birdsongs of these species involves an interaction of both learnt and innate structure.

An interesting consequence of the fact that some birdsongs are partially learnt is that variation can develop. There can be 'regional dialects' within the same species and, as with humans, these dialects are transmitted from parents to offspring. Researchers have noted, in fact, that dialect differences may be better preserved in songbirds than in humans because there is no homogenisation of regional accents due to radio or television. We will discuss human language dialects in Chapter 9.

Honey bees have a particularly interesting signalling system. When a forager bee returns to the hive, it communicates to other bees where a source of food is located by performing a dance on a wall of the hive to reveal the location and quality of the food source. For one species of Italian honey bee, the dancing may assume one of three possible patterns: *round* (which indicates locations near the hive, within 6 metres or so); *sickle* (which indicates locations 6 to 18 metres from the hive); and *tail-wagging* (for distances that exceed 18 metres). The number of repetitions per minute of the basic pattern in the tail-wagging dance indicates the precise distance – the slower the repetition rate, the longer the distance. The number of repetitions and the intensity with which the bee dances the round dance indicates the richness of the food source – the more repetitions and the livelier the bee dance, the more food to be had.

Bee dances are discrete in some sense, consisting of separate parts, and in principle they can communicate infinitely many different messages, like human language; but unlike human language the topic is always the same – namely, food. They lack the displacement property. As experiments have shown, when a bee is forced to walk to a food source rather than fly, it will communicate a distance many times farther away than the food source actually is. The bee has no way of communicating the special circumstances of its trip. This absence of creativity makes the bee's dance qualitatively different from human language.

As we will discuss in Chapter 8, the human language ability is rooted in the human brain. Just like human language, the communication system of each species is determined by its biology. This raises, again, the interesting question of whether it is possible for one species to acquire the language of another.

Can animals learn human language?

> It is a great baboon, but so much like man in most things ... I do believe it already understands much English; and I am of the mind it might be taught to speak or make signs.
>
> Entry in Samuel Pepys' diary, 1661

The idea of talking animals is as old and as widespread among human societies as language itself. All cultures have legends in which some animal speaks. All over west Africa, children listen to folktales in which a 'spider-man' is the hero. 'Coyote' is a favourite figure in many Native American tales, and many an animal takes the stage in Aesop's famous fables. Bugs Bunny, Mickey Mouse and Donald Duck are icons of American popular culture. The fictional Doctor Dolittle communicated with all manner of animals, from giant snails to tiny sparrows, as did Saint Francis of Assisi.

In reality, various species show abilities that seem to mimic aspects of human language. Talking birds, such as parrots and mynahs, can be taught to faithfully reproduce words and phrases, but this does not mean they have acquired a human language. As the poet William Cowper put it:

> 'Words learned by rote a parrot may rehearse; but talking is not always to converse'.[3]

Talking birds do not decompose their imitations into discrete units. *Polly* and *Molly* do not rhyme for a parrot. They are as different as *hello* and *goodbye*. If Polly learns to say *Polly wants a cracker* and *Polly wants a doughnut*, and also learns to say *whisky* and *bagel*, she will not then spontaneously produce *Polly wants whisky* or *Polly wants a bagel* or *Polly wants whisky and a bagel*. If she learns *cat* and *cats*, and *dog* and *dogs*, and then learns the word *parrot*, she will not be able to form the plural *parrots* as children do. Unlike every developing child, a parrot cannot generalise from particular instances and therefore cannot produce sentences he has not been directly taught. A parrot – even a very verbose one – cannot produce an unlimited set of utterances from a finite set of units. The imitative utterances of talking birds mean nothing to the birds; these utterances have no communicative function. It is clear that simply knowing how to produce a sequence of speech sounds is not the same as knowing a language. But what about animals that appear to learn the meanings of words? Do they have human language?

Dogs can easily be taught to respond to commands such as 'heel', 'sit', 'fetch' and so on, and even seem to understand object words like *ball*, *toy* and so on. Indeed, in 2004 German psychologists reported on a border collie named Rico (Figure 1.5) that had acquired a 200-word vocabulary (containing both German and English words). When asked to fetch a particular toy from a pile of many toys, Rico was correct over 90 per cent of the time. When told to fetch a toy whose name he had not been previously taught, Rico could match the novel name to a new toy among a pile of familiar toys about 70 per cent of the time – a rate comparable to that of young children performing a similar novel name task. More recently, a border collie named Chaser that lives in South Carolina in the US was reported to understand the names of 1022 toys! Chaser was taught these names over a three-year period. Like Rico, he is able to connect a novel name to a new toy placed in a huge pile of toys whose names he already knows.

Figure 1.5 **Rico responding to a command by fetching a toy**

AAP Photos/Reuters/Manuela Hartling

Rico and Chaser are clearly very intelligent dogs and their name recognition skills are amazing. It is unlikely, however, that Rico or Chaser (or Spot or Rover) understand the *meanings* of words or have acquired a symbolic system in the way that children do. Rather, they learn to associate a particular sequence of sounds with an object or action. For Chaser and Rico, the name 'Sponge Bob', for example, might mean something like 'fetch Sponge Bob' – what the dog has been taught to do. The young child who has learnt the name 'Sponge Bob' knows that it refers to a particular toy or television character independent of any a particular game or context. The philosopher Bertrand Russell ('The Uses of Language') summed up the dog rather insightfully, noting that

> 'however eloquently he may bark, he cannot tell you that his parents were honest though poor'.

In their natural habitats, chimpanzees, gorillas and other non-human primates communicate with each other through visual, auditory, olfactory and tactile signals. Many of these signals seem to have meanings associated with the animals' immediate environment or emotional state. They can signal danger and can communicate aggressiveness and subordination. However, the natural sounds and gestures produced by all non-human primates are highly stereotyped and limited in the type and number of messages they convey, consisting mainly of emotional responses to particular situations. They have no way of expressing the anger they felt yesterday or the anticipation of tomorrow.

Even though primate communication systems are quite limited, many people have been interested in the question of whether they have the latent capacity to acquire complex linguistic systems similar to human language. Throughout the second half of the twentieth century, there were a number of studies designed to test whether non-human primates could learn human language, including both words (or signs) and the grammatical rules for their combination.

In early experiments researchers raised chimpanzees in their own homes alongside their children, in order to recreate the natural environment in which human children acquire language. The chimps were unable to vocalise words despite the efforts of their caretakers, although they did achieve the ability to understand a number of individual words. Primates' vocal tracts do not permit them to pronounce many different sounds but because of their manual dexterity, sign language was an attractive alternative to test their cognitive linguistic ability. Starting with a chimpanzee named Washoe and continuing over the years with a gorilla named Koko and another chimp ironically named Nim Chimpsky (after Noam Chomsky; Nim was the subject of a movie, *Project Nim*, released in August 2011), intense efforts were made to teach them American Sign Language. Although the primates achieved small successes, such as the ability to string two signs together and to occasionally show flashes of creativity, none achieved the qualitative linguistic ability of a human child.

Similar results were obtained in attempting to teach primates artificial languages designed to resemble human languages in some respects. Common chimpanzees Sarah, Lana, Sherman and Austin, and, more recently, a male bonobo (or pygmy chimpanzee) named Kanzi, were taught languages whose 'words' were plastic chips, or keys on a keyboard, which could be arranged into 'sentences'. The researchers were particularly interested in the ability of primates to communicate using such abstract symbols.

These experiments also came under scrutiny. Questions arose over what kind of knowledge Sarah and Lana were showing with their symbol manipulations and to what extent their responses were being inadvertently cued by experimenters. Many scientists, including some who were directly involved with these projects, have concluded that the creative ability that is so much a part of human language was not evidenced by the chimps' use of the artificial languages. As often happens in science, the search for the answers to one kind of question leads to answers to other questions. The linguistic experiments with primates have led to many advances in our understanding of primate cognitive ability. Researchers have gone on to investigate other capacities of the chimp mind, such as causality. These studies also point out how remarkable it is that within just a few short years, without the benefit of explicit guidance and regardless of personal circumstances, all human children are able to create new and complex sentences never spoken and never heard before.

Can computers learn human language?

Computers are prolific. If you are reading this book, there is a high likelihood that you use a computer, be it as large as a desktop or as small as an Apple Watch. You may also be able to speak to your computer and it may speak back. Your computer may take dictation, translate between languages, read an electronic newspaper out loud and give you the definition of *eleemosynary*. These are the trappings of human language, but does your computer, or any computer, have human language competence?

We saw earlier that two key properties of human language are discreteness and displacement. Computer speech has both these properties. Spoken words are assembled from discrete, prestored units of sound; and sentences from a prestored lexicon of words. Moreover, computer speech may refer to the past, present or future and to its current location or another place.

Unlike talking birds, computers have no trouble generalising sentences, such as 'Polly wants a cracker' to 'Polly wants some whisky' or even to 'Hedwig likes mice'. Forming plurals or past tenses are also easily programmable. A computer could associate one million spoken names of objects to pictures of those objects, putting poor Chaser (and all of us) to shame. As to the lack of creativity among non-human primates, computers suffer from no such drawback. Computers have been programmed to write poetry, learn new words, and even provide psychological counselling.

Even the best of language-using computers have distinctly non-human language traits. While humans never pronounce the same word twice identically, computers always do. Humans suffer from slips of the tongue, fumbled pronunciations and convoluted phrasing. Humans often speak in fits and starts, hemming and hawing, and inserting filler sounds such as 'um' and 'you know'. Humans repeat words in a sentence such as 'I … I … I don't want to paint uh I mean stain … stain my floor, no, I mean the decking'. Humans bollix their syntax and realise it after they may have said 'The horses away ran from the barn jumped the fence over'. Computers never do any of this unless they are purposefully programmed to do so, and even when they are, the 'mistakes' sound disingenuous.

Nonetheless, it may be argued that these are issues of linguistic performance. The toughest test of linguistic competence is a version of one first suggested by Alan M. Turing (1912–1954), the British mathematician who is considered the founder of modern computer science. Behind two screens are placed a computer and a human. An interrogator engages both voices behind the screens in conversation. If based on language usage, the interrogator is unable to determine which is the human and which is the computer, then one might argue that the computer has attained human linguistic competence.

No computer has come close to passing this 'Turing test', fictional computers and robots to the contrary notwithstanding. Indeed, the test has never been seriously administered. Moreover, if in an unforeseeable future a computer was programmed to pass this test, it would be the ingenuity and linguistic competence of the programmers on display, not the computer nor its software. Despite the intelligence of animals and machines, none has achieved the linguistic competence of any healthy human being.

CHAPTER REVIEW

Summary

We are all intimately familiar with at least one language – our own. Yet few of us ever stop to consider what we know when we know a language. No book contains, or could possibly contain, all the elements of the English or Russian or Zulu language. The words of a language can be listed in a dictionary, but all the sentences cannot be. However, a language consists of these sentences as well as words. Speakers use a finite set of rules to produce and understand an infinite set of possible sentences.

These rules are part of the grammar of a language, which develops when you acquire the language and includes the sound system (the phonology), the structure and properties of words (the morphology and lexicon), how words may be combined into phrases and sentences (the syntax), and the ways in which sounds and meanings are related (the semantics). The sounds and meanings of individual words are related in an arbitrary fashion. If you had never heard the word *syntax* you would not, by its sounds, know what it meant. The gestures used by signers are also arbitrarily related to their meanings. Language, then, is a system that relates sounds (or hand and body gestures) with meanings. When you know a language you know this system.

This knowledge (linguistic competence) is different from behaviour (linguistic performance). You have the competence to produce a million-word sentence, but performance limitations, such as memory and endurance, keep this from occurring.

There are different kinds of 'grammars'. The *descriptive grammar* of a language represents the unconscious linguistic knowledge or capacity of its speakers. Such a grammar is a model of the mental grammar every speaker of the language knows. It does not teach the rules of the language; it describes the rules that are already known. A grammar that attempts to legislate what your grammar should be is called a *prescriptive grammar* – it prescribes. It does not describe, except incidentally. Teaching grammars are written to help people learn a foreign language or a dialect of their own language.

The more that linguists investigate the thousands of languages of the world and describe the ways in which they differ from each other, the more they discover that these differences are limited. Linguistic universals pertain to each of the parts of grammars, the ways in which these parts are related and the forms of rules. According to one influential hypothesis, these principles comprise Universal Grammar (UG), which provides a blueprint for the grammars of all possible human languages and constitutes the innate component of the human language faculty that makes normal language development possible.[4]

Strong evidence for UG is found in the way children acquire language. Children learn language by exposure. They need not be deliberately taught, although parents may enjoy 'teaching' their children to speak or sign. Children will learn any human language to which they are exposed, and they learn it in definable stages, beginning at a very early age.

The fact that deaf children learn sign language shows that the ability to hear or produce sounds is not a prerequisite for language learning. All of the sign languages in the world, which differ as spoken languages do, are visual–gestural systems that are as fully developed and as structurally complex as spoken languages. The major sign language used in Australia is called Australian Sign Language, or Auslan.

If language is defined merely as a system of communication, or the ability to produce speech sounds, then language is not unique to humans. There are, however, certain characteristics of human language not found in the communication systems of any other species. A basic property of human language is its creativity – a speaker's ability to combine the basic linguistic units to form an infinite set of well-formed grammatical sentences, most of which are novel, never before produced or heard.

For many years, researchers were interested in the question of whether language is a uniquely human ability. There have been many attempts to teach non-human primates communication systems that are supposed to resemble human language in certain respects. Overall, results have been disappointing. Some chimpanzees have been trained to use an impressive number of symbols or signs. But a careful examination of their multi-sign utterances reveals that unlike children, the chimps show little creativity or spontaneity. Their 'utterances' are often unwittingly cued by trainers and have little syntactic structure. Some highly intelligent dogs have also learnt a significant number of words, but their learning is restricted to a specific context and it is likely that their

'meanings' for these words are very different from the symbolic or referential meanings that would be learnt by a human child.

Computer scientists have laboured for decades to program computers with the linguistic competence of a human. While the results are impressive, and computers appear to be able to talk, listen, and understand, there is little evidence that human linguistic competence has been achieved.

Exercises

1 An English speaker's knowledge includes the sound sequences of the English language. When new products are put on the market, the manufacturers have to create names for them that conform to the allowable sound patterns of the language. Suppose you were hired by a manufacturer of soap products to name five new products. What names might you come up with? List them.

As we are interested in how the names are pronounced, describe in any way you can how to say the words you list. Suppose, for example, you named one detergent *Blick*. You could describe the sounds in any of the following ways:
bl **as in** ***blood, i*** **as in** ***pit*****,** ***ck*** **as in** ***stick***
bli **as in** ***bliss*****,** ***ck*** **as in** ***tick***
b **as in** ***boy*****,** ***lick*** **as in** ***lick*****.**

2 Consider the following sentences. Put an asterisk (*) before those that do not seem to conform to the rules of your grammar; that is, those that seem ungrammatical to you. State, if you can, why you think the sentence is ungrammatical.
- a Robin forced the sheriff go.
- b Napoleon forced Josephine to go.
- c The devil made Faust go.
- d He passed by a large pile of money.
- e He drove by my house.
- f He drove my house by.
- g Did in a corner little Jack Horner sit?
- h Elizabeth is resembled by Charles.
- i Nancy is eager to please.
- j It is easy to frighten Emily.
- k It is eager to love a kitten.
- l That birds can fly flabbergasts.
- m The fact that you are late to class is surprising.
- n Has the nurse slept the baby yet?
- o I was surprised for you to get married.
- p I wonder who and Mary went swimming.
- q Myself bit John.
- r What did Alice eat the toadstool with?
- s What did Alice eat the toadstool and?

3 It was pointed out in this chapter that a small set of words in languages may be onomatopoeic; that is, their sounds imitate what they refer to. *Ding-dong*, *tick-tock*, *bang*, *zing*, *swish* and *plop* are such words in English. Construct a list of 10 new onomatopoeic words. Test them on at least five friends to see if they are truly non-arbitrary as to sound and meaning.

4 Although sounds and meanings of most words in all languages are arbitrarily related, there are some communication systems in which the signs unambiguously reveal their meaning.
- a Describe (or draw) five different signs that directly show what they mean. Example: a road sign indicating an S curve.
- b Describe any other communication system that, like language, consists of arbitrary symbols. Example: traffic signals, where red means stop and green means go.

5 Consider these two statements: 'I learnt a new word today'. 'I learnt a new sentence today'. Do you think the two statements are equally probable? Give reasons for your answer.

6 An African grey parrot named Alex who was the subject of a 30-year experiment was reported to have learnt the meanings of 150 words. There are many reports online about Alex's impressive abilities. In the light of evidence presented in this chapter, or based on your own online research, discuss whether Alex's communications were the results of classical operant conditioning, as many scientists believe, or whether he showed true linguistic creativity, as his trainers maintain.

7 A wolf is able to express subtle gradations of emotion by different positions of the ears, the lips and the tail. There are 11 postures of the tail that express such emotions as self-confidence, confident threat, lack of tension, uncertain threat, depression, defensiveness, active submission and complete submission. This system seems to be complex. Suppose there were a thousand different emotions that the wolf could express in this way. Would you then say a wolf had a language similar to a human's? If not, why not?

8 Suppose you taught a dog to *heel*, *sit up*, *roll over*, *play dead*, *stay*, *jump* and *bark* on command, using the italicised words as cues. Would you be teaching it language? Why?

9 **Challenge exercise:** One of the key assumptions of this book and an important discovery of modern linguistics is that sign languages are essentially the same as spoken languages except that they use gestures instead of sound. However, we know people use gestures when they communicate in speech. Write a short essay on the role of gestures in spoken language interaction (see Goldin-Meadow and Alibali, 2013, listed in the 'Further reading' section).

10 State some rule of grammar that you have learnt is the correct way to say something but that you do not generally use in speaking. You may, for example, have learnt that 'It's me' is incorrect and that the correct form is 'It's I'. Nevertheless, you always use 'me' in such a sentence; your friends do also and, in fact, 'It's I' sounds odd to you.

Write a short essay presenting arguments against someone who tells you that you are wrong. Discuss how this disagreement demonstrates the difference between descriptive and prescriptive grammars.

11 Noam Chomsky has been quoted as saying:

> It's about as likely that an ape will prove to have a language ability as that there is an island somewhere with a species of flightless birds waiting for human beings to teach them to fly.[5]

In the light of evidence presented in this chapter, or based on your own online research, comment on Chomsky's remark. Do you agree or disagree, or do you think the evidence is inconclusive?

12 **Challenge exercise:** In the text, we discussed how birdsongs are fundamentally different from human language. However, some recent studies suggest that the acoustic patterns of some bird songs resemble the acoustic patterns found in speech. Research this topic, starting from the article by James and Sakata (2017) listed in the 'Further reading' section, and write a short essay.

13 Think of song titles that are 'bad' grammar but which, if corrected, would lack effect. The 1929 Fats Waller classic 'Ain't Misbehavin'', for example, is clearly superior to the bland 'I am not misbehaving'. Try to come up with five or ten such titles.

14 Linguists who attempt to write a descriptive grammar of linguistic competence are faced with a difficult task. They must understand a deep and complex system based on a set of sparse and often inaccurate data. (Children learning language face the same difficulty.) Albert Einstein and Leopold Infield captured the essence of the difficulty in their book *The Evolution of Physics*, written in 1938:

> In our endeavour to understand reality we are somewhat like a man trying to understand the mechanism of a closed watch. He sees the face and the moving hands, even hears its ticking, but he has no way of opening the case. If he is ingenious he may form some picture of a mechanism which could be responsible for all the things he observes, but he may never be quite sure his picture is the only one which could explain his observations. He will never be able to compare his picture with the real mechanism and he cannot even imagine the possibility of the meaning of such a comparison.

Write a short essay that speculates on how a linguist might go about understanding the reality of a person's grammar (the closed watch) by observing what that person says and does not say (the face and moving hands). A person might, for example, never say 'The sixth sheik's sixth sheep is sick as a dog', but the grammar should specify that it is a well-formed sentence, just as it should somehow indicate that 'came the messenger on time' is ill formed.

15 View the movie *My Fair Lady* (drawn from the play *Pygmalion* by George Bernard Shaw). Note every attempt to teach grammar (pronunciation, word choice and syntax) to the character of Eliza Doolittle. This is an illustration of 'teaching grammar'.

16 English words containing *dge* in their spelling (*trudge*, *edge*) are said mostly to have an unfavourable or negative connotation. Research this notion by accumulating as many *dge* words as you can and classifying them as unfavourable (*sludge*) or neutral (*bridge*). What do you do about *budget*? Unfavourable or not? Are there other questionable words?

17 *Euphemism treadmill* refers to the linguistic phenomenon in which a euphemism evolved to be as offensive as the word it replaced, requiring yet another euphemism. Provide some examples from English. (Hint: Sex, race and bodily functions are good places to start.)

18 **Challenge exercise:** Read the *Cratylus Dialogue* by Plato – it is available online at http://classics.mit.edu/Plato/cratylus.html. In it is a discussion (or dialogue) of whether names are conventional (i.e. what we have called 'arbitrary') or natural. Do you find Socrates' point of view sufficiently well-argued to support the thesis in this chapter that the relationship between form and meaning is indeed arbitrary? Argue your case in either direction in a short (or long if you wish) essay.

19 **Challenge exercise:** It is claimed that Pirahã – an indigenous language of Brazil – violates some of the universal principles hypothesised by linguists. Which principles are in question? Is the evidence persuasive? Conclusive? Speculative? (As a starting point, use the journal *Current Anthropology*, *46*(4), August–October 2005 and the journal *Language*, *85*(2), June 2009.)

20 **Challenge exercise:** There are approximately 7000 languages spoken today in the world according to the encyclopaedia *Ethnologue: Languages of the World* (see https://www.ethnologue.com/endangered-languages). Many languages are seriously endangered and some will cease to be spoken in the near future. Write a short essay on the topic of language endangerment and what linguists and language planners can and should do about it.

21 There are, very roughly, about half a million words in use in today's English language according to current unabridged dictionaries. However, if we reach back to the beginnings of the printing press and examine large amounts of published English we find an additional half a million words now no longer in use, such as *slethem*, a musical instrument. Write a short essay arguing one way or the other that the lexicon of the English language ought to be counted as containing one million or so words. Feel free, as always, to poke around the internet to inform yourself further.

22 The linguist Geoffrey Pullum has published a number of incisive criticisms of some prescriptive grammarians' advice on English usage. Research Pullum's view on this topic (see also his posts on the popular linguistics blog *Language Log* at http://languagelog.ldc.upenn.edu/nll) and write a short essay about the issues he raised, focusing on arguments and evidence.

23 **Challenge exercise:** Constructed languages are languages that are consciously designed and invented for various purposes. It has been claimed that the process of inventing languages can provide us with insight into the structure of natural languages. Research this topic, starting from the video talk by the linguist David Adger on Language Invention and Language Structure (https://www.youtube.com/watch?v=RA5NXBbXYdQ), and write a short essay.

24 **Challenge exercise:** In this chapter, we discussed the phenomenon of sound symbolism and noted that even though there are some words whose pronunciation suggests their meaning, there appears to be no consistent pattern across languages. However, there are recent studies that challenge this conclusion. Research this topic, starting from the article by Dingemanse et al. (2016) listed in the 'Further reading' section, and write a short essay.

25 In the text, we discussed a number of prescriptive rules in English, such as the prohibition on using two negatives in a sentence. If you speak another language, provide some examples of prescriptive rules in the language.

26 In the text we mentioned speech error, which is an anomalous or ungrammatical utterance due to an involuntary deviation from an intended utterance. Provide five actual examples of speech errors using the Fromkin Speech Error Database (https://www.mpi.nl/dbmpi/sedb/sperco-search.pl).

27 In his recent book *Language Unlimited*, the linguist David Adger (2019) invites readers to carry out the following simple experiment:

> Make [a sentence] up that, say, spans at least one line on the page. Now go to your favourite search engine and put in the sentence you've made up, in inverted commas, so that the search engine looks for an exact match. Now hit return.

Adger then asks the question: 'does your sentence exist anywhere else on the internet?'

Discuss briefly what you found out from your search. What does this tell us about the nature of human language?

Further reading

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Weblinks

- https://lexicon.hum.uu.nl – The Lexicon of Linguistics offers a dictionary of linguistic terms. If you come across a linguistic term you are not familiar with, it is a great place to start your search. Bookmark this site – it will save you precious time during your preparation for exams!
- http://thebrain.mcgill.ca/flash/capsules/outil_rouge06.html – This site presents Chomsky's Universal Grammar, observations that support the Chomskyan view of language as well as criticisms of Chomsky's theories.
- http://www.open.edu/openlearn/education – This site provides some interesting activities and questions for discussion so you have a clearer understanding of the similarities and differences between human and animal communicative behaviour.
- http://www.auslan.org.au – At this site you will find a dictionary, a brief history and a corpus of Australian Sign Language (Auslan).
- https://www.sila.org.au – Another great Australian website for all kinds of language–related information and tools.

Endnotes

1 The sign languages of the deaf will be discussed throughout the book. As stated, they are essentially the same as spoken languages except that they use gestures instead of sound. A reference to 'language', then, unless speech sounds or spoken languages are specifically mentioned, includes both spoken and signed languages.

2 It is important to note here that the concept of 'UG' is controversial and not accepted by all linguists. For alternative ways of explaining the similarity across languages see Goldberg (2019), Tomasello (2008, 2019) listed in the 'Further reading' section.

3 The poem 'Conversation'. The Poems of William Cowper, Esq. of the inner temple. Complete in one volume.

4 For a recent perspective on the debate on language universals see Evans, N and Levinson, S (2009), Evans, V (2014) listed in the 'Further reading' section.

5 Chomsky, N 1980, 'Are those apes really talking? Skeptics say it is mostly a lot of monkeyshines', *Time*, 3 October, 115.

Part 2

Grammatical aspects of language

> The theory of grammar is concerned with the question: What is the nature of a person's knowledge of [their] language, the knowledge that enables [them] to make use of language in the normal, creative fashion? A person who knows a language has mastered a system of rules that assigns sound and meaning in a definite way for an infinite class of possible sentences.
>
> Noam Chomsky, *Language and Mind*, 1968

2 Phonetics: the sounds of language

7111 languages are spoken today. That number is constantly in flux, because we're learning more about the world's languages every day. And beyond that, the languages themselves are in flux. They're living and dynamic, spoken by communities whose lives are shaped by our rapidly changing world. This is a fragile time: Roughly 40 per cent of languages are now endangered, often with less than 1000 speakers remaining. Meanwhile, just 23 languages account for more than half the world's population.

Source: Ethnologue by SIL International

Learning objectives

After reading Chapter 2, you should be able to:

- show an understanding that speech is produced through carefully coordinated overlapping vocal gestures that lead to disturbances in the air creating dynamic changes in acoustic energy
- demonstrate familiarity with the International Phonetic Alphabet (IPA) and its ability to represent the speech sounds of the world's languages, showing a particular understanding of the IPA symbols used to represent Australian English speech sounds
- categorise the consonant sounds of English according to the taxonomy determined by the International Phonetic Association and show an understanding of some additional consonantal features used across the world's languages
- describe the major features used to classify the vowels of the world's languages, with a focus on Australian English
- show how the phonetic features of length, pitch and loudness can be used in language to create the prosodic characteristics of rhythm, stress, intonation and tone
- compare the difference between spoken and signed languages through your understanding that signed languages use combinations of features such as handshape, orientation, movement and location to distinguish meaning.

The speech sounds that humans use in language are restricted to those we can make with our vocal organs and that we can easily differentiate when we listen to speech. All spoken languages use classes of sounds known as vowels and consonants, make use of air flowing from the lungs, and use pitch in some way to signal meaning. These fundamental similarities exist across languages, but there are also a great many differences between the world's languages in terms of the type and number of sounds used. Some spoken languages use a very small number of speech sounds to differentiate words. For instance, Rotokas – a language spoken by people on the island of Bougainville – uses as few as 11 speech sounds. Others like !Xóõ (also known as East Taa) – a language of Botswana – is reported to have the largest inventory of speech sounds of all languages, with up to 161 sounds used to differentiate words.[1]

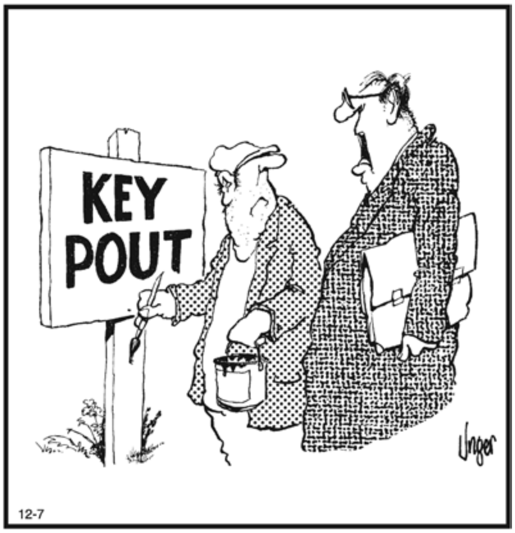
This chapter will discuss speech sounds, how we produce them and how they may be classified.

Speech sounds

The scientific study of speech sounds is called **phonetics**. To describe speech sounds, we need to know the characteristics of the sound and how each sound differs from all others. This is not as easy as it may seem because when we speak the sounds overlap and it can be a challenge to determine where one sound ends and the next begins. Nevertheless, when we know a language, our brain disentangles the sounds from each other allowing us to identify individual words and interpret the speaker's intention. This helps us to avoid the confusion of the sign painter in the cartoon shown in **Figure 2.1**.

phonetics
The scientific study of linguistic speech sounds, how they are physically produced (**articulatory phonetics**), how they are perceived (**auditory** or **perceptual phonetics**) and their acoustic characteristics (**acoustic phonetics**).

Figure 2.1 'Keep out! Keep out! K-E-E-P O-U-T'



When we know a spoken language, we know the *sounds* of that language and how to combine those sounds into words. As an example, speakers of English know the sounds represented by the letters *t*, *p*, *o* and *s*, and can combine these sounds to form the words *tops, stop, spot or pots.* They also know that there are four separate speech sounds in these words. Yet physically the spoken word is one continuous flow of sound created through overlapping speech gestures. We are able to **segment** that continuous sound into its component parts because we know the language. We can also recognise those parts when they occur in other words, as *p* does in *p*en or ri*p*, as *o* does in *o*n, as *t* does in *t*rue or wa*t*er, and as *s* does in *s*i*s*ter.

segment
An individual sound that occurs in a language; the act of dividing utterances into sounds, **morphemes**, words and phrases.

It is not possible to segment the sound of a person clearing their throat into a sequence of discrete parts or units. This is not because throat-clearing is one continuous sound but because such sounds are not speech and therefore cannot be segmented into the sounds of speech. English speakers can separate *keepout* into the two words *keep* and *out* even when there is no break between the words. This is because there are clues in the stream of speech that help us make the correct interpretation. We do not generally pause between words in speech (except when we take a breath), even though we may think we do. Children learning a language can provide evidence for this. A two-year-old child going down the stairs heard his mother remind him to, 'hold on'. He replied, 'I'm holing don, I'm holing don', showing that he is still learning where the break between words occurs. In fact, historically, word boundary misperceptions have changed the form of words. The English word *apron* was still pronounced as *napron* in the sixteenth century from the Old French word *naperon*. However, the phrase *a napron* was so often misperceived as *an apron* that the word lost its initial *n*. Some phrases and sentences that are clearly distinct when printed may become confused when spoken. Read the following pairs aloud and think about why it might be possible to misinterpret what we hear:

a name	an aim
that stuff	that's tough
I scream	ice-cream

The lack of breaks between spoken words and individual sounds may give the impression that speakers of other languages run their words together. However, running words together is true of all speakers of all languages. It is the nature of human speech production that speech sounds and individual words overlap in time. X-ray (fluoroscopy) or real-time MRI videos of a person speaking makes the lack of breaks in speech very clear. We can see the tongue, jaw and lips in continuous motion as the speech sounds are produced. The video gallery from the University of Southern California – Speech Production and Knowledge Group (SPAN) illustrates the continuous nature of speech through real-time MRI (http://sail.usc.edu/span/gallery.html). SPAN also has a webpage dedicated to the real-time MRI study of human beatboxing. In beatboxing the vocal apparatus are used to simulate percussive instruments.[2]

Even though speech sounds flow continuously and overlap in time, generally speaking, knowledge of our language(s) (albeit often unconscious) means we have no difficulty breaking up the stream of continuous sound into words, and it is usually possible to identify individual speech sounds as well. Speakers whose linguistic system is fully developed and intact have implicit knowledge about the types of sounds that are used in their language and how those sounds can combine to create words.

Identity of speech sounds

> From a strictly articulatory point of view there is no succession of sounds.
>
> Roman Jakobson, Six Lectures on Sounds and Meaning, 1942

It is truly amazing, given the overlapping nature of the speech signal, that we are able to understand the individual words in an utterance. This ability is more surprising because no two speakers ever say the same word identically. The speech signal produced when one speaker says *cat* is not exactly the same as that of another speaker's *cat*. Even two utterances of *cat* by the same speaker will differ to some degree. Yet our brain is able to equate the different utterances as having the same linguistic meaning. Importantly, the differences between the two provide non-linguistic information about the speakers, such as their age, gender, background and a raft of other characteristics not specifically related to the linguistic meaning.

Our knowledge of a language determines the type of judgements we make about speech. The example above of the word *cat* shows that we are able to judge physically different sounds to be the same. We know which aspects of pronunciation are important for interpreting linguistic meaning and which are not. If, for example, someone coughs in the middle of saying 'How (cough) are you?' a listener will ignore the cough when interpreting the linguistic meaning of the phrase. Or if a speaker has a cold or laryngitis, we can factor out these effects when interpreting the speech signal. People speak at different **pitch** levels, at different speeds, at different loudness levels. Their vocal tracts are different sizes and their voice qualities vary, but such personal differences are non-linguistic. Our linguistic knowledge makes it possible to identify non-linguistic and linguistic differences of this kind and to make optimal use of the features that help us to interpret language.

pitch
How high or low the voice is perceived to be; the listener's perception of **fundamental frequency**.

Furthermore, we are very capable of making sounds that are not speech sounds in our language(s) but may be sounds in a different language. Many English speakers can make a clicking sound of disapproval that writers sometimes represent as *tsk*. This sound never occurs as part of an English word. It is even difficult for many English speakers to combine this clicking sound with other sounds. Yet clicks are speech sounds in Xhosa, Zulu, Sesotho and Khoekhoe – languages spoken in southern Africa – just like the *k* or *t* in English. Speakers of those languages have no difficulty producing them as parts of words. Thus, *tsk* is a speech sound in Xhosa but not in English. The sound represented by the letters *th* in the word *think* is a speech sound in English but not in French. Languages differ from one another in the inventory of speech sounds from which words are built.

One of the aims of phonetics is to scientifically explore the sounds used in all languages of the world. **Acoustic phonetics** focuses on the acoustic properties of sounds, **auditory phonetics** (or perceptual phonetics) is concerned with how listeners perceive these sounds, and **articulatory phonetics** is the study of how the vocal tract produces the sounds of language.[3]

acoustic phonetics
The study of the acoustic characteristics of speech sounds.

auditory phonetics
The study of the perception of speech sounds.

articulatory phonetics
The study of how the vocal tract produces speech sounds – the physiological characteristics of speech sounds.

orthography
The conventional way of using characters in writing that relates to some structure of the linguistic system. English orthography uses an alphabetic writing system.

The phonetic alphabet

> My son William has hit upon a new method of spelling Fish. As thus: – G.h.o.t.i. *Ghoti*, fish. Nonsense! say you. By no means, say I. It is perfectly vindicable orthography. You give it up? Well then, here is the proof. *Gh* is *f*, as in *tough, rough, enough*; *o* is *i* as in *women*; and *ti* is *sh*, as in *mention, attention*, &c. So that *ghoti* is *fish*.
>
> Letter from Charles Ollier to Leigh Hunt ,11 December 1855[4]

Orthography (alphabetic spelling) may not represent the sounds of a language in a consistent way. This is certainly the case in English where the spelling system derives from a previous time in history leading to a mismatch with modern day pronunciation. It is easy to find examples to show that ordinary spelling with our Roman alphabet can be inadequate for the task of representing English words. Consider sentences such as:

Did h**e** bel**ie**ve that C**ae**sar could s**ee** the p**eo**ple s**ei**ze the s**ea**s?

The sill**y** am**oe**ba stole the k**ey** to the mach**i**ne.

The same 'ee' *sound* is represented variously by *e*, *ie*, *ae*, *ee*, *eo*, *ei*, *ea*, *y*, *oe*, *ey* and *i*.

On the other hand, consider:

M**a**ny **a** vill**a**ge m**a**ster w**a**tched the d**a**zed l**a**ds.

Here the letter *a* represents the various sounds in *many*, *a*, *village*, *master, watched, dazed,* and *lads*.

Making the spelling waters even muddier, we find that a combination of letters may represent a single sound:

*sh*oot	*ch*aracter	*Th*omas	*ph*ysics
ei*th*er	d*ea*l	rou*gh*	na*ti*on
c*oa*t	ra*ci*al	*th*eatre	pl*ai*n

Or, conversely, the single letter *x*, when not pronounced as *z* (as in *xylophone*), usually stands for the *two* sounds *ks* as in *box* (pronounced 'boks').

Some letters have no sound in certain words (so-called *silent* letters):

*m*nemonic	autum*n*	resi*g*n	g*h*ost
*p*terodactyl	*w*rite	hol*e*	cor*ps*
*p*sychology	s*w*ord	de*b*t	*g*naw
bou*gh*	lam*b*	i*s*land	*k*not

Or, conversely, there may be no letter to represent sounds that occur. In many words, the letter *u* represents a *y* sound followed by a *u* sound:

c*u*te	(sounds like k*yu*te; compare: c*oo*t)
f*u*el	(sounds like f*yu*el; compare: f*oo*l)
*u*se	(sounds like *yu*se; compare: *oo*ze)

International Phonetic Association
An organisation founded in 1888 to further the scientific study of phonetics and to develop and maintain the IPA.

International Phonetic Alphabet (IPA)
The phonetic alphabet designed by the International Phonetic Association and used to represent the speech sounds found in all human languages. The IPA aims to provide a one-to-one relationship between each symbol and each speech sound.

transcription – narrow phonetic
The detailed representation of speech sounds using phonetic symbols represented between square brackets [ ].

vowel
A voiced speech sound produced with minimal constriction in the vocal tract allowing air to flow unobstructed through the **oral cavity.** Vowel sounds form the centres of syllables.

Throughout several centuries English scholars have advocated spelling reform. Yet reformers have failed to change our spelling habits, and it took phoneticians to devise a way for the same sound to be represented with the same symbol every time, and for any particular symbol to stand for the same sound every time. In Paris in 1888, members of the **International Phonetic Association** developed a phonetic alphabet to symbolise the sounds of all languages. The association grew out of the need for language teachers to use a standard way of representing speech sounds in their teaching. The idea was to encourage accurate pronunciation of all languages by language learners. The alphabet utilised both ordinary English letters as well as symbols from other alphabetic systems. Each character of the alphabet was assigned exactly one value across all of the world's languages so that someone who knew this alphabet would know how to pronounce a word written in it, and on hearing a word pronounced, would know how to write it using the phonetic symbols. The architects of the **International Phonetic Alphabet**, or **IPA** as it is commonly known, knew that a phonetic alphabet should include enough symbols to represent the sounds of all languages of the world. At the same time, it should not include non-crucial variations such as loudness, which may vary widely across speakers. The International Phonetic Association is now the professional association of phoneticians and, apart from overseeing the IPA, it promotes the scientific study of phonetics. It is conventional for detailed phonetic transcription of speech to be enclosed in square brackets [ ]. This is called narrow *phonetic* **transcription**. A more general (and less detailed) form of transcription, called broad phonetic transcription (sometimes called *phonemic transcription)*, can also be used and this type will be discussed in Chapter 3. Broad transcription uses slant brackets (forward slashes) / /.

Turning now to English, it is clear that there are many accents, each with its own particular set of sounds. Consider the different accents of American English, British English, Australian English and New Zealand English. The inventory of sounds for each accent can be represented by a selection of symbols from the IPA. The conventionalised set of symbols used to represent the sounds of British English may differ from those used to represent the sounds of American English or Australian English or any other form of English.

Table 2.1 lists symbols that have been selected from the IPA to represent the major classes of sounds that occur in Australian English. For the **vowel** sounds two sets of symbols are given because the traditional method for describing the vowels of Australian English has undergone reform in recent years. The traditional transcription system was imported from Britain by A. G. Mitchell in 1946 and published in *The Pronunciation of English in Australia.*[5] In the 1980s, phoneticians began to question the use of the British set of symbols for the description of Australian English, and in 1997, Harrington, Cox and Evans (HCE)[6] proposed a revised set of symbols that were reported to more accurately reflect Australian English vowel production.[7] After all, Australian English accents are quite different from the accents of other English dialects (although they share many similarities with New Zealand English) and require a separate set of symbols to reflect these differences, just as British English and American English use their own individual symbol sets extracted from the IPA. In **Table 2.1** we have included both the MD (Mitchell and Delbridge) set and the HCE set. HCE is the primary system used in this text; however, on occasion the MD transcription is given beside it and indicated with grey font. As the HCE set has been designed to more accurately indicate Australian

English pronunciations, it is particularly useful for applications such as speech pathology or Teaching English to Speakers of Other Languages (TESOL). The MD set focuses on the similarities between Australian, New Zealand and southern-British based varieties of English, and therefore does not have the same level of phonetic accuracy as HCE, but it is useful if correspondence between the Australian, New Zealand and southern-British based varieties of English is required. The *Macquarie Dictionary* still uses the MD system. You should clarify with your lecturer which system is most applicable for your purposes. Note that the MD symbols are typically used to represent New Zealand English vowels but Bauer et al. (2007) have suggested a modified set.[8]

Table 2.1 Symbols used to represent Australian English sounds

Consonants				Vowels					
				HCE	MD		HCE	MD	
p	pet	z	zip	iː	i	beat	æɪ	eɪ	bay
b	bet	θ	thick	ɪ	ɪ	bit	ɑe	aɪ	buy
m	mitt	ð	this	e	ɛ	bet	oɪ	ɔɪ	boy
t	tip	ʃ	shoe	æ	æ	bat	æɔ	aʊ	how
d	dip	ʒ	measure	ʉː	u	boot	əʉ	oʊ	hoe
n	nit	h	hat	ɜː	ɜ	bird	ɪə	ɪə	ear
k	could	ʧ	chill	ɐː	a	father	eː	ɛə	air
g	good	ʤ	Jill	ɐ	ʌ	but		ʊə*	tour (rare)
ŋ	sing	l	lip	oː	ɔ	bought			
f	fan	ɹ	rip	ʊ	ʊ	put			
v	van	j	you	ɔ	ɒ	pot			
s	sip	w	whip	ə	ə	sofa			

*The vowel [ʊə] is rarely found in the speech of younger Australians and is not included in the list of symbols for the HCE set. In words like *tour*, it is replaced by a sequence of vowels [ʉːə] and in words like *poor* it is replaced by [oː].

Table 2.1 does not provide all the symbols needed for the sounds of all English accents. The HCE set provides the symbols selected from the IPA to represent Australian English sounds. Speech sounds vary from person to person and also according to their position in a word, but this detail is not represented by the symbols given in **Table 2.1**. When we discuss the sounds in more depth later in this chapter and in Chapter 3, we will add the symbols necessary to describe this detail.

The symbol [ə], the last sound in the word *sofa* on the bottom line of the table, is the vowel we call 'schwa'. We use it to represent an unstressed vowel whose duration is usually very short (e.g. the first sound in *above*, the last sound in *pasta)*. The schwa is pronounced with the mouth (tongue, lips, jaw) in a relatively neutral position. Its production may vary according to the speaker and to its position in the word. All other vowel symbols in the table can receive at least some emphasis but schwa never receives emphasis in English. It is always unstressed. Note that the New Zealand English vowel that occurs in words like *fish* and *ship* is similar to schwa but this vowel does receive emphasis. New Zealand English also uses the unstressed schwa in words like *above* and *pasta.*

The IPA distinguishes between the two sounds [ɹ] and [r] (see **Figure 2.6** for the full IPA chart); the first represents the usual English pronunciation of *r* (as in a word like *red)*, the second is a **trill** sound, sometimes called the 'rolled r'. The trill does not occur in most varieties of English but is found in some varieties of Scottish English. These two IPA symbols are often used interchangeably to describe English *r* sounds. However, here we will use the correct IPA symbol [ɹ] to represent the typical English *r*.

trill
A sound in which a rapid vibration of the articulators occurs, e.g. the [r] in the Spanish *perro* is articulated by vibration of the tongue tip behind the alveolar ridge.

Speakers of other varieties of English, or of different varieties of Australian English, may not pronounce words in the same way. In Australian and New Zealand English, two different vowel sounds are used in the words *bought* and *pot*, but some speakers of American English pronounce these words with the same vowel; others pronounce them with the vowel sounds in *bore* and *bar*, respectively. There are a great many varieties of English. The versions spoken in different parts of England, America, Ireland and in Singapore, among other countries, vary in their pronunciations. Even within Australian English and New Zealand English, there is a considerable phonetic variation. It would be a very long list indeed if we were to include all the symbols needed to represent all the differences in English, so here we have just included those symbols that can best be used to describe the most common variety of Australian English.

Using the symbols from **Table 2.1**, we can represent the speech sounds that occur in words. Here we use broad transcription to show the general pronunciation.[9] It is extremely important when thinking about phonetic aspects of speech to disregard spelling and focus instead on sound patterns in words. The six words in **Table 2.2** illustrate how we can be tricked by spelling if we are not careful. In these words, the letter sequence *ou* represents six distinct vowel sounds; the *gh* is silent in all but *rough*, where it is pronounced [f]; the *th* in *though* represents a different speech sound from that in *thought* and *through*; and the *l* in *would* is silent.

Table 2.2 **Examples of irregular spelling in English**

Spelling	Pronunciation	
	HCE	MD
though	/ðəʉ/	/ðoʊ/
thought	/θoːt/	/θɔt/
rough	/ɹɐf/	/ɹʌf/
bough	/bæɔ/	/baʊ/
through	/θɹʉː/	/θɹu/
would	/wʊd/	/wʊd/

Sound and spelling correspondences

> I never had any large respect for good spelling.
>
> Mark Twain, Autobiography

Table 2.3 shows the major sound–spelling correspondences for Australian English consonants and vowels. We have used the symbols for the broad classes of speech sounds – those that are required for differentiating the words of English. English is a worldwide language and is spoken in many forms in many countries so it is possible that some of the pronunciations given here may differ from your own.

Table 2.3 **Sound and spelling correspondences**

Consonants	
Symbol	**Examples**
/p/	pit pot peak spit spot speak tip apple ample hiccough appear
/b/	bat bubble burble brick black tab amble
/t/	tick tough top stick stuff stop trick pit pot write kissed kicked intend pterodactyl attack
/d/	dip drip guard cad cured ride sending mend loved
/k/	kin cat charisma skin stick critique anchor asking mechanic
/g/	girl guard grab bag ogre agnostic longer
/ʧ/	choke church match feature rich lunch righteous constituent
/ʤ/	judge George jelly gelatine midget magistrate region residual
/m/	mat tam smack amble amnesia comb Emmy camp
/n/	nap know mnemonic gnostic snow can design any pneumatic
/ŋ/	sing long think finger singer ankle
/f/	fat fish philosophy fracture flat phlogiston coffee reef cough comfort
/v/	vat veal value dove gravel rival anvil ravage
/θ/	thigh through thistle think wrath moth wreath ether arithmetic
/ð/	the their then breathe lathe teethe mother either rather
/s/	scissors psychology skip snip pass pats packs democracy fasten
/z/	zip Xerox xylophone jazz pads kisses maize lies razor design lazy scissors physics
/ʃ/	shoe shy sure mush marsh fish mission nation facial deduction Russian logician
/ʒ/	rouge measure vision azure casualty decision Cartesian
/h/	hat who whole rehash
/l/	leaf lock plant applaud palace pole milk doll
/ɹ/	reef rock prune cruel Paris
/j/	you yes feud use
/w/	witch which where whale swim queen

Vowels – monophthongs		
HCE symbol	**MD symbol**	**Example**
/iː/	/i/	beet beat we see sea receive key believe amoeba people
/ɪ/	/ɪ/	bit consist injury malignant bin
/e/	/ɛ/	bet serenity reception says dead said
/eː/	/ɛə/	air where shared
/æ/	/æ/	pan act anger rally sad
/ɐː/	/a/	father palm car sergeant

larynx
The structure in the throat made up of cartilages and muscles that separates the lower and upper respiratory tracts and contains the **glottis** – the space between the vocal folds.

pharynx
The tube or cavity in the vocal tract above the **larynx** through which air passes during speech production.

trachea
The tube that runs from the top of the lungs to the larynx, often called the windpipe.

glottis
The opening between the vocal folds.

oral cavity
The mouth area through which air passes during the production of speech; see also **nasal cavity**.

nasal cavity
The passageway between the throat and the nose through which air passes during speech if the **velum** is lowered; see also **oral cavity**.

velum
The part of the roof of the mouth behind the hard palate that can be raised to separate the oral from the nasal cavity or lowered to allow air to flow into both the oral and nasal cavities; also called the soft palate.

/ɐ/	/ʌ/	b**u**t t**ou**gh am**o**ng **o**ven d**oe**s c**o**ver fl**oo**d
/ɔ/	/ɒ/	p**o**t h**o**nour h**o**spital mel**o**dic
/oː/	/ɔ/	b**ough**t c**augh**t st**al**k c**ore** s**aw** b**a**ll **au**thor **awe**
/ʊ/	/ʊ/	p**u**t f**oo**t b**u**tcher c**ou**ld
/ʉː/	/u/	b**oo**t wh**o** s**ew**er thr**ough** t**o** t**oo** tw**o** m**o**ve L**ou**
/ɜː/	/ɜ/	b**ir**d h**er**d w**or**d f**ur** p**er**t
/ə/	/ə/	sof**a** **a**lone princip**a**l tel**e**graph symph**o**ny ros**e**s diffic**u**lt s**u**ppose mel**o**dy melodi**ou**s want**e**d kiss**e**s th**e** fath**er**
	Vowels – diphthongs	
/æɪ/	/eɪ/	b**ay** b**ai**t m**a**te
/ɑe/	/aɪ/	b**uy** b**i**te m**igh**t
/oɪ/	/ɔɪ/	b**oy** b**oi**l b**uoy**
/æɔ/	/aʊ/	h**ow** **ou**t t**ow**n
/əʉ/	/oʊ/	h**oe** b**o**ne c**oa**t
/ɪə/	/ɪə/	**ear** h**ere** b**eer**

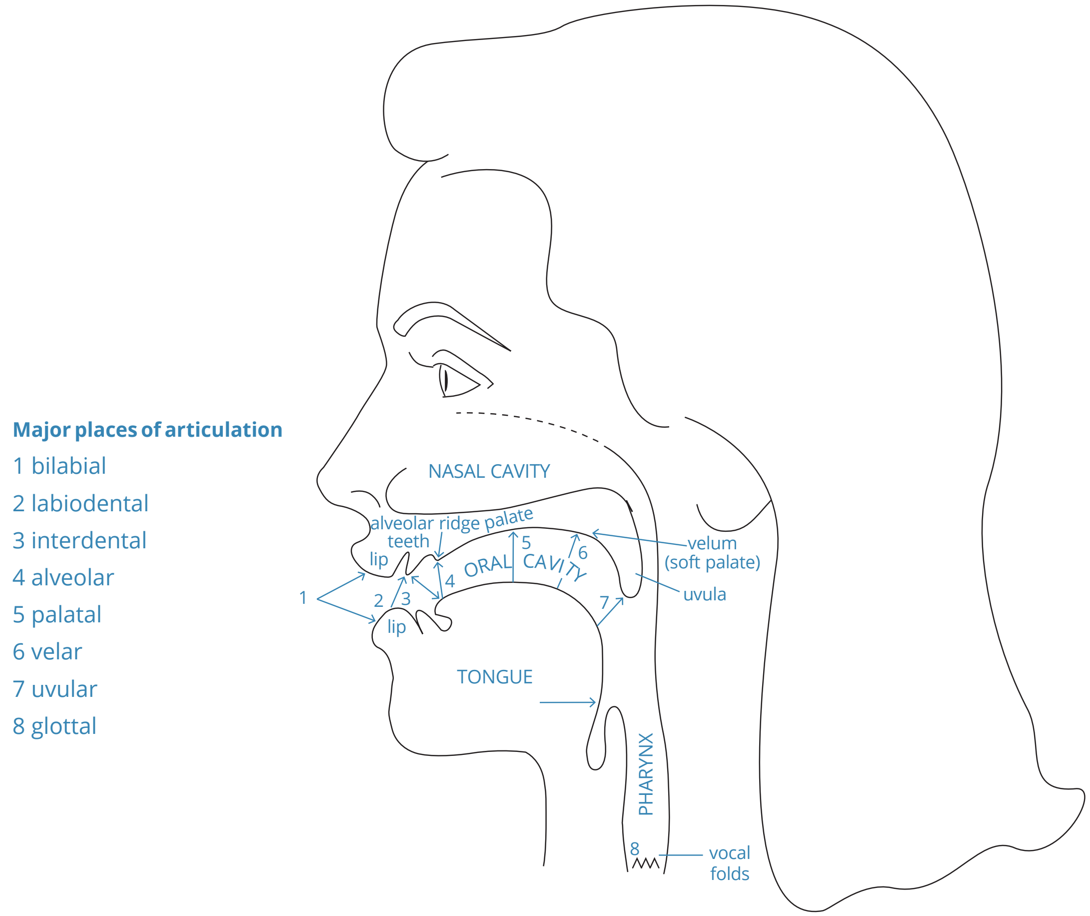
Categorising speech sounds

> The voice is articulated by the lips and the tongue … [Humans speak] by means of air which [is inhaled] into [the] entire body and particularly into the body cavities. When the air is expelled through the empty space it produces a sound, because of the resonances in the skull. The tongue articulates by its strokes; it gathers the air in the throat and pushes it against the palate and the teeth, thereby giving the sound a definite shape. If the tongue would not articulate each time, by means of its strokes, [humans] would not speak clearly and would only be able to produce a few simple sounds.
>
> Hippocrates (460–377 BCE)

The production of any sound in nature involves the movement of air. Most speech sounds are produced by air flowing from the lungs, past the vocal folds (sometimes called vocal cords) in the **larynx**, up through the throat (**pharynx**) into the mouth and/or nose, and finally out of the body. At this point, a brief anatomy lesson is in order with the help of the schematic illustration in **Figure 2.2**. The vocal folds are a pair of shelves made up of muscle, ligament and membrane located in the larynx (sometimes called the voice box), which sits on top of the **trachea**, the tube through which air flows to and from the lungs. The opening between the vocal folds is the **glottis**. The tubular part of the throat above the larynx is the pharynx. What most people call 'the mouth' is the **oral cavity**, as distinct from the **nasal cavity** – the nose and the tubes that connect it to the throat, plus the sinuses. Finally, there are the tongue, the lips, the jaw, and the **velum** (soft palate) – the major articulators, which are capable of movements that change the size and shape of the cavities. All of these cavities and structures together comprise the **vocal tract.** The various sounds of language result from different vocal tract shapes. When we move the tongue, lips, jaw and velum, we are effectively modifying the spaces in which the air can move. Air within containers of different sizes and shapes makes different sounds when stimulated. For example, if you blow across the neck of a bottle or strike a drum, the size of the body of air within the space affects the type of sound that results. This is why different speech sounds are made when we change the shape of our vocal tract. Once the air is set into motion typically by the activity of the lungs and the larynx, it travels past, around and within these structures, which are moving in a highly complex and coordinated way to create speech. Figure 2.3 is an MRI image of the vocal tract.[10] The posture of the articulators in this image is for the vowel in the word 'eat'. Comparing this image to the schematic in Figure 2.2 will give you a better sense of the size and location of the articulators in a real human body.

vocal tract
The oral and nasal cavities, together with the **larynx** and the **pharynx**, all of which may be involved in the production of speech sounds.

Figure 2.2 The vocal tract



Speech sounds are produced as a sequence of overlapping gestures created by movements of the tongue, lips, jaw, larynx and other structures within the vocal tract. Gestures can be difficult to describe and it is common in phonetic descriptions to represent each gesture in a simplified way to indicate the target of the gesture. This should never be taken to mean that any speech sound is a static event. The descriptions that follow must be understood as simply symbolic of the articulation of the vowels and consonants as they do not provide any detail of the actual tongue shape or the exact nature of the vocal tract configuration. The core business of phonetic science is to understand the intricacies of the speech processes. Therefore, considerable ongoing research aims to provide a more detailed understanding of the characteristics of speech production. In the sections that follow, we will use the recognised IPA categories as a frame of reference to help you learn about the production of vowels and consonants but this will necessarily provide a simplified account.

Figure 2.3 An MRI image of the vocal tract

MRI image courtesy of Catherine Watson – Department of Electrical and Computing Engineering, Auckland University

Consonants

> In speech he stretched out his vowel sounds to give his mouth a rest before the next consonant.
>
> Diane Setterfield, *The Thirteenth Tale*, 2007

consonant
A speech sound produced with some constriction of the vocal tract; see also **vowel.**

The sounds of all languages fall into two classes: vowels (which will be discussed later in this chapter) and **consonants**. Consonants are usually produced with some form of constriction or closure in the vocal tract that impedes the flow of air from the lungs. In phonetics, the terms *consonant* and *vowel* refer to types of *sounds*, not to the letters that represent them. When we talk about the alphabet, we may call *a* a vowel and *b* a consonant, but that simply means that we use the letter *a* to represent vowel sounds and the letter *b* to represent consonant sounds. In the descriptions that follow, we will use square brackets to show that each IPA symbol refers to a particular sound that occurs in a wide variety of different languages. We will not provide a full list of consonants of the world's languages in this description, as this would be beyond the scope of this introductory textbook, but we will cover all of the sounds of English with the addition of some sounds from other languages to illustrate major phonetic concepts. The full IPA chart can be found in **Figure 2.6**.

Place of articulation

place of articulation
The part of the vocal tract at which constriction occurs during the production of **consonants**.

Consonants can be classified according to the position within the vocal tract where constriction to airflow occurs. This is the consonant **place of articulation**. Movement of the vocal folds, the tongue and the lips may create a constriction, reshaping the oral cavity in certain ways to produce various sounds. As you read the descriptions of each sound class that follows, refer back to **Table 2.1**, which provides key words containing the important sounds of English. As you pronounce these words, try to feel which **articulators** are moving and how they are moving. Watching yourself in a mirror helps, too. Consult **Figure 2.2** for help with the terminology.

Bilabial [p] [b] [m]

When we produce a [p], [b] or [m], we articulate by bringing both lips together, making a **bilabial sound**. For example, [p] is the last sound in *lap*, [b] is the last sound in *lab* and [m] is the last sound in *lamb*.

Labiodental [f] [v]

We use our lips and teeth to form [f] and [v]. We articulate these **labiodental sounds** by touching the bottom lip to the upper front teeth as in the last sounds in *leaf* and *leave,* respectively.

Dental [θ] [ð]

Dental sounds, both spelt *th*, are produced by placing the tongue tip behind the upper front teeth. For some speakers, the tongue is inserted between the teeth, making what is more correctly called an **interdental sound**. Watch yourself in a mirror and say *thick* [θɪk] or *this* [ðɪs] and see where your tongue tip goes.

Alveolar [t] [d] [n] [s] [z] [l]

All six **alveolar sounds** in English are produced with the tongue raised in various ways to the **alveolar ridge**, for example in the last sounds of the words *right*, *ride*, *Rhine*, *rice*, *rise*, and *rile,* respectively.

For [t, d, n] the tongue tip is raised and touches the alveolar ridge. For [s, z] the sides of the front of the tongue are raised, but the tip is lowered just a fraction creating a groove so that air escapes along it. For [l] the tongue tip is usually raised while the sides of the tongue are lowered a little, permitting air to escape over the sides. [l] is called a **lateral sound**. Some speakers create [l] with just one side of the tongue lowered. You can feel this laterally flowing air in the *l*s of *lolly*.

Postalveolar [ʃ] [ʒ] [ʧ] [ʤ] [ɹ]

The first four of these sounds, which occur in *fissure* [fɪʃə], *leisure* [leʒə] [lɛʒə], *chip* [ʧɪp] and *Jack* [ʤæk], are made by raising the **blade of the tongue** (the part just back from the tip) to the area behind the alveolar ridge. These postalveolar consonants in English are commonly referred to as palatoalveolars. The consonant [ɹ] is a bit different from the other four because it is produced in various ways by different people – either the tongue tip or the front of the tongue can typically be raised to the **postalveolar** region (but this can vary from alveolar to palatal) and there is very little obstruction to the airstream. In some varieties of English, the tip of the tongue is curled back behind the alveolar ridge while producing this consonant. This curled tongue tip articulation creates a **retroflex sound** (retroflex articulations are often used in Australian Aboriginal languages and in languages of the Indian subcontinent, such as Hindi and Tamil). Other symbols can be used for various *r* sounds and in a very detailed phonetic description we might need to include some of them.

Palatal [j]

For **palatal sounds**, for example in *yak* [jæk], the front part of the tongue is raised towards the palate. Note that this is *not* the transcription of the word Jack, which would be transcribed as [ʤæk].

Velar [k] [g] [ŋ]

Another class of sounds is produced by raising the back of the tongue towards the velum (or soft palate). The final sounds of the words *back*, *bag* and *bang* are all **velar sounds**.

articulators
The tongue, lips, **velum** etc. that change the shape of the vocal tract to produce different speech sounds.

bilabial sound
A sound articulated by bringing both lips together.

labiodental sound
A sound produced by touching the bottom lip to the upper teeth.

dental sound
A sound articulated with the tongue against, or nearly against, the front teeth.

interdental sound
A sound produced by inserting the tip of the tongue between the upper and lower teeth.

alveolar sound
A sound produced by raising the tongue to the alveolar ridge.

alveolar ridge
The rough ridge on the roof of the mouth directly behind the top front teeth. It is the place of articulation for speech sounds like [s], [t], [n].

lateral sound
A sound produced with air flowing around the side(s) of the tongue.

blade of the tongue
The part of the top surface of the tongue behind the tip.

postalveolar
The region behind the **alveolar ridge**.

retroflex sound
A sound produced by curling the tip of the tongue back behind the **alveolar ridge**; commonly found in Australian Aboriginal languages.

palatal sound
A sound produced by raising the front part of the tongue to the bony arch of the roof of the mouth.

velar sound
A sound produced by raising the back of the tongue to the soft palate, or **velum**.

glottal/glottal stop
A sound produced with constriction at the glottis; when the air is stopped completely at the glottis by tightly closed vocal folds, a glottal stop is produced.

uvular sound
A sound produced by raising the back of the tongue to the uvula, the fleshy appendage extending from the end of the velum (soft palate).

pharyngeal sound
A sound produced by retracting the root of the tongue towards the back wall of the pharynx.

voiceless sound
A speech sound produced without vibration of the vocal folds.

voiced sound
A speech sound produced with vibrating vocal folds.

Glottal [h] [ʔ]

The sound [h] is made by the flow of air passing through the narrowed glottis, and past the tongue and lips as they prepare to pronounce the following vowel sound.

If the air is stopped completely at the glottis by tightly closed vocal folds, the sound created is a **glottal stop** [ʔ]. The interjection *uh oh* has a glottal stop between the two vowel sounds. The glottal stop is not considered one of the main speech sounds of English because it does not contrast with any other speech sound to create words, but it does occur as a variant of *t* (e.g. in words like *butler*) in many varieties of English, including Australian English.[11]

Non-English places of articulation

Uvular

Uvular sounds are produced by raising the back of the tongue to the uvula, the fleshy protuberance that extends from the back of the velum and hangs down at the back of the throat. The *r* in French is often a uvular trill symbolised by [ʀ]. The uvular sound [q] occurs in Arabic. [ɢ] is a rare uvular but does occur in Persian. None of these sounds ordinarily occurs in English.

Pharyngeal

Pharyngeal sounds are relatively rare sounds produced by retracting the root of the tongue towards the pharyngeal wall. [ħ] and [ʕ] are pharyngeal consonants found in Agul, a language of Dagestan, a republic of Russia. These sounds are not typically used in English.

Table 2.4 summarises the English consonants by their place of articulation.

Table 2.4 Place of articulation of English consonants

Bilabial	p	b	m			
Labiodental	f	v				
Dental	θ	ð				
Alveolar	t	d	n	s	z	l
Postalveolar	ʃ	ʒ		ʧ	ʤ	ɹ
Palatal	j					
Velar	k	g	ŋ			
Glottal	h					

We have described several classes of consonants according to their *place of articulation*, yet we are still unable to distinguish the sounds within each class from one another. What distinguishes [p] from [b]? Both are bilabial sounds. What is the difference between [t] and [d], which are both alveolar sounds?

Voicing

If the vocal folds are apart when speaking, air flows freely through the glottis into the oral cavity, producing a **voiceless sound**. [s] and [p] in *super* are two of the many voiceless sounds of English.

If the vocal folds are held lightly together, we can make them vibrate by applying a pressurised airstream below the folds as the air is gradually released from the lungs. Such sounds created while the vocal folds are vibrating are said to be **voiced**. The [b] and [z] in *buzz* are two of the many voiced sounds of English. To get a sense of voicing, hold your hands over your ears and say the voiced *z-z-z-z-z*. You can feel the vibrations of the vocal folds and the buzzing sound in your head. If you now say the voiceless *s-s-s-s-s*, you will not sense these vibrations (although you might hear a hissing sound). When you whisper, you are making all the speech sounds voiceless.

The voiced/voiceless distinction is very important in English. It differentiates the words in pairs, such as the following:

rip/rib	hat/had	knack/nag
[ɹɪp]/[ɹɪb]	[hæt]/[hæd]	[næk]/[næg]

The first word of each pair ends with a voiceless sound and the second word with a voiced sound. In each word pair the position of the lips and tongue is the same for these final sounds. The difference between the pairs relates to the voicing of this last consonant.

The voiced/voiceless distinction also occurs in the following pairs, where the first word begins with a voiceless sound and the second with a voiced sound:

fat/vat	sip/zip	cheer/jeer
[fæt]/[væt]	[sɪp]/[zɪp]	[ʧɪə]/[ʤɪə]

When a voiceless sound is followed by a voiced sound, such as a vowel, the open vocal folds necessary for the voiceless consonant must close lightly so they can vibrate for the production of the vowel. In the case of voiced consonants the vocal fold vibration continues from the consonant into the following vowel.

Voicing is not always just simply related to vocal fold vibration. Compare the initial sound in the word *pit* with the second sound in the word *spit*. There is a phonetic difference between these two voiceless sounds. Voiceless sounds, like these two types of *p*, fall into two classes depending on the timing of the vocal fold closure. When we say *pit*, the first sound is bilabial, made by closing the lips. It is also voiceless, so there is no vocal fold vibration. The vocal folds remain open for a short time after the lips come apart to release the *p*. We call this *p* **aspirated** because a brief puff of air escapes before the vocal folds close for the voicing of the following vowel. Aspiration is indicated by the superscript ^{h} in the IPA.

When we produce the *p* in *spit*, however, the vocal folds start vibrating almost as soon as the lips open. The *p* in *spit* is still voiceless because the vocal folds are apart while the lips are closed, but it is **unaspirated**. Hold your palm about five centimetres in front of your lips and say *pit*. You will feel a strong puff of air for the *p* that is not there when you say *spit*. The *t* in *tick* and the *k* in *kin* are also aspirated voiceless stops, while the *t* in *stick* and the *k* in *skin* are unaspirated voiceless stops.

Finally, in the production of the voiced [b] (and [d] and [g] as well), the vocal folds often vibrate while the articulators are closed, and continue to vibrate during the vowel sound that follows after the articulators part.

We indicate aspirated sounds by writing the phonetic symbol for aspiration with a superscript *h*, as in the following examples. The aspirated and unaspirated stops in English are different types of voiceless stop but still belong to the voiceless stop category.

pit	[p^{h}ɪt]	spit	[spɪt]
tick	[t^{h}ɪk]	stick	[stɪk]
kit	[k^{h}ɪt]	skit	[skɪt]

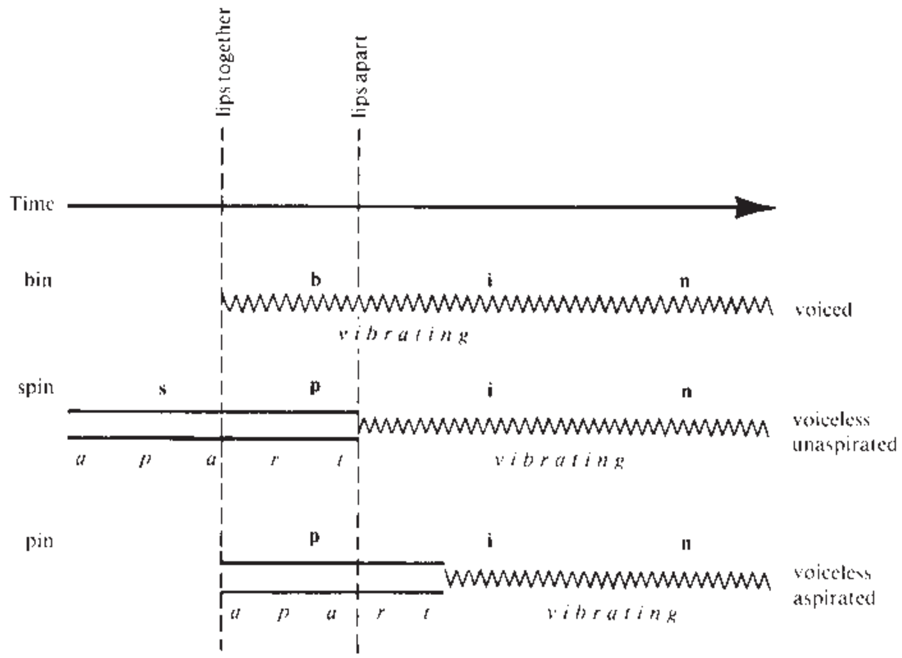
Voicing for stops depends not only on the vibration of the vocal folds themselves, but on the relationship between the timing of the vocal fold gestures and the tongue/lip gestures. Figure 2.4 shows in diagrammatic form the timing of lip closure in relation to the state of the vocal folds and illustrates the two different voicing types (voiced and voiceless) and the subcategories of voiceless (aspirated and unaspirated).

voicing
The characteristic of a speech sound mainly determined by the presence or absence of vocal fold vibration; whether it is voiced or voiceless.

aspirated
Describes a voiceless stop produced with a puff of air that results when the vocal folds remain open for a brief period after the release of the stop, e.g. the [p^{h}] in *pit*. (Aspiration is indicated by the superscript ^{h} in the IPA.)

unaspirated
Phonetically **voiceless** stops in which the vocal folds begin vibrating very soon after release of the closure, e.g. [p] in *spot*.

Figure 2.4 **Timing of lip closure and vocal fold vibrations for voiced, voiceless unaspirated and voiceless aspirated bilabial stops [b], [p], [pʰ]**



The voiced/voiceless distinction differentiates the bilabials [b] and [p]. But the sound [m] is also a bilabial and it is voiced, so what distinguishes it from [b]?

Manner of articulation

We are seeing finer and finer distinctions of speech sounds, but some of the differences still have not been captured. Speech sounds also vary in the way that the air is channelled through the vocal tract; that is, their **manner of articulation**. Manner of articulation describes the degree of constriction that impedes the airflow and the pathway of the flow.

Figure 2.3 shows that the dome of the roof of the mouth can be divided into the hard palate and the soft palate (velum). The palate is the bony vault of the roof of the mouth. You can feel it with your tongue. Now, slide your tongue backwards along the hard palate; you should be able to feel the velum where the flesh becomes soft and pliable. The velum terminates in the uvula, which you can see in a mirror if you open your mouth wide. The velum is movable, and when it is raised all the way to touch the back of the throat, the passage through the nose is cut off and air can escape only through the mouth.

Sounds produced with the raised velum blocking the air from escaping through the nose are **oral sounds** because the air can escape only through the oral cavity. Most sounds in languages are oral sounds. When the velum is lowered allowing air to escape through the nose, **nasal sounds** are produced. The sound [m] is a nasal consonant. Therefore [m] is distinguished from [b] because it is a nasal sound with the velum lowered, whereas [b] is an oral sound with the velum raised.

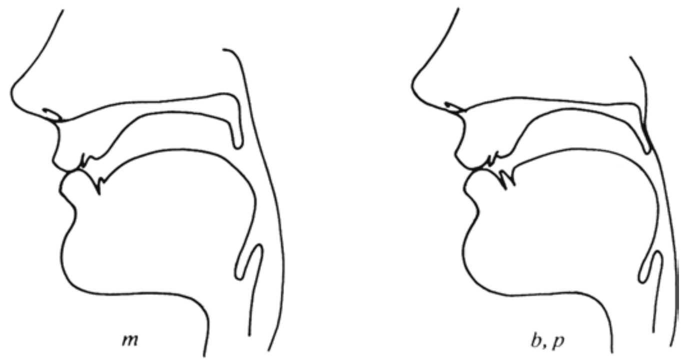
The diagrams in Figure 2.5 show the position of the lips and the velum when [m], [b] and [p] are articulated. The sounds [m], [b] and [p] are produced by stopping the airflow at the lips; [m] and [b] differ from [p] by being voiced; and [m] differs from [b] by being nasal.

manner of articulation
The way the airstream is obstructed as it travels through the vocal tract. **Stop**, **nasal**, **affricate** and **fricative** are some manners of articulation.

oral sound
A non-nasal speech sound produced by raising the **velum** to close the nasal passage so that air can escape only through the mouth.

nasal (nasalised) sound
A speech sound produced with a lowered **velum** (and therefore an open nasal passage) allowing air to pass through the nose as well as into the mouth, e.g. [m].

Figure 2.5 **Position of lips and velum for [m] (lips together, velum down) and [b], [p] (lips together, velum up)**



The same oral/nasal difference occurs for the final sounds in *bid/bin* and *rag/rang*. The velum is raised in the production of [d] and [g], preventing the air from flowing through the nose, whereas for [n] and [ŋ] the velum is lowered, which allows the air to flow out through the nose during the consonant constriction. The sounds [m], [n] and [ŋ] are therefore nasal sounds, and [b], [d] and [g] are oral sounds.

The presence or absence of the properties – nasal and voiced – permit the division of speech sounds into four classes: voiced, voiceless, nasal and oral, as shown in **Table 2.5**.

Table 2.5 **Four classes of speech sounds**

	Oral			Nasal		
Voiced	b	d	g	m	n	ŋ
Voiceless	p	t	k	*	*	*

*All languages with nasals have voiced nasals. There are a few languages, such as Burmese, that have voiceless nasals as well as voiced nasals.

We now have three ways of classifying consonants: by voicing, by place of articulation and by nasality. For example, [p] is a voiceless bilabial oral sound, [n] is a voiced alveolar nasal sound and so on. However, we still have a problem because both [t] and [s] are voiceless alveolar oral sounds. So what distinguishes them? After all, *tack* and *sack* are different words. The answer is that sounds also vary in the way the airstream is affected as it flows from the lungs up and out of the mouth and nose. It may be blocked or partially blocked to varying degrees.

Stop [p] [b] [m] [t] [d] [n] [k] [g] [ŋ] [ʔ]

Stops are consonants in which the airstream is completely blocked in the oral cavity for a short period (tens of milliseconds). Stops are **non-continuants**. The sound [t] is a stop but the sound [s] is not, and that is what makes them different speech sounds even though they have the same place and voicing characteristics. Types of stops in English include:

- *bilabial stops*: [p], [b] and [m] – the airstream is stopped at the mouth by the complete closure of the lips
- *alveolar stops*: [t], [d] and [n] – the airstream is stopped by the tongue tip, making a complete closure at the alveolar ridge
- *velar stops*: [k], [g] and [ŋ] – the back of the tongue makes a complete closure at the velum
- *glottal stop*: [ʔ] – the air is completely stopped at the glottis by vocal fold closure.

stop
A sound in which the airflow is briefly but completely stopped in the oral cavity; falls under the class of **non-continuant** consonants.

non-continuant
A sound in which air is blocked momentarily in the oral cavity as it passes through the vocal tract; see also **stops**, **affricates**.

There is also a whole set of stops from other languages that are not part of the inventory of English consonants. For example, in Quechua – a language spoken in Bolivia and Peru – uvular stops occur, where the back of the tongue is raised to form a complete closure with the uvula. The phonetic symbol [q] denotes the voiceless version of this stop. In contrast to the very small stop inventory of English, most Australian Aboriginal languages have a very large number of oral and nasal stops that use a whole range of different places of articulation. Yindjibarndi – a language from the Pilbara region of Western Australia – has six places of articulation for oral and nasal stops: the oral stops are bilabial [p], dental [t̪], alveolar [t], retroflex [ʈ], palatal [c][12] and velar [k]; and the nasal stops are bilabial [m], dental [n̪], alveolar [n], retroflex [ɳ], palatal [ɲ] and velar [ŋ]. It is interesting that although Aboriginal Australian languages use many different places of articulation, they do not generally make use of a voicing distinction and rarely have fricatives. The University of Melbourne Research Unit for Indigenous Languages has an excellent set of videos introducing the sounds of Australian Aboriginal languages.[13]

Fricative [f] [v] [θ] [ð] [s] [z] [ʃ] [ʒ] [h]

continuant
A speech sound in which the airstream flows continuously through the mouth; that is, all speech sounds except stops and affricates.

fricative
A **consonant** sound produced with such a narrow constriction in the vocal tract that a hissing sound is created.

In the production of some **continuants**, the airflow is severely restricted but not totally blocked so that friction results. These sounds are called **fricatives**. The first sound in the following pairs of fricatives is voiceless, the second is voiced:

- *labiodental fricatives*: [f] and [v] – the friction is created as air flows between the bottom lip and the upper front teeth, where a narrow passage permits the air to escape
- *dental fricatives* [θ] and [ð] – represented by *th* in *thin* and *then*; the friction occurs at the narrow opening between the tongue and teeth
- *alveolar fricatives*: [s] and [z] – with the friction created between the tongue and the alveolar ridge
- *postalveolar fricatives*: [ʃ] and [ʒ] – contrast in such pairs as *fissure* [fɪʃə] and *leisure* [leʒə]; they are produced with friction created as the air passes between the tongue and the postalveolar region. In English, the voiced postalveolar fricative never occurs at the beginning of a word except for words borrowed from other languages, such as *genre*. The voiceless postalveolar fricative begins the words *ship* [ʃɪp] and *shack* [ʃæk], and ends the words *rash* [ɹæʃ] and *bush* [bʊʃ]
- *glottal fricative*: [h] – its relatively weak voiceless sound comes from air passing through the narrowed glottis.

There are other fricatives that do not generally occur in English. For example, the *bilabial fricatives* [ɸ] and [β] (used in Ewe, a Niger-Congo language), *palatal fricatives* [ç] and [ʝ] ([ç] is the sound that often occurs at the beginning of English words like *huge*, *velar fricatives* [x] and [ɣ] (used in Vietnamese), *uvular fricatives* [χ] and [ʁ] (present in some dialects of Dutch) and *pharyngeal fricatives* [ħ] and [ʕ] (present in Agul, as described previously). These sounds are produced in the usual fricative way: by moving the articulators so that they nearly touch, and allowing the air forced through the narrow passage to create friction and the characteristic fricative hissing sound. Lateral fricatives also occur in sounds where the air flows turbulently around the sides of the tongue. Welsh is the most commonly known language containing the voiceless lateral fricative [ɬ]. The voiced variant occurs in Zulu [ɮ].

Affricate [ʧ] [ʤ]

affricate
A sound produced by a stop closure followed immediately by a slow-release characteristic of a fricative; phonetically a single sound created by the sequence of stop + fricative, e.g. the *ch* in *chip* is [ʧ].

Affricates are produced by creating a stop closure followed immediately by a gradual release of the articulators, producing an effect characteristic of a fricative. [ʧ] and [ʤ] are *postalveolar affricates* with complete stop closures at the postalveolar region. The postalveolar sounds at the beginning and end of the words *church* and *judge* are voiceless and voiced affricates, respectively. Affricates are non-continuants because of the initial stop closure. These complex sequential articulations are considered single phonetic segments. Other languages make use of affricates at a range of different places of articulation. For instance, Mandarin, Polish, Russian and Italian use the voiceless dental [ts̪]. Polish and Italian contrast this with the voiced [dz̪] affricate.

Approximant [j] [w] [ɹ] [l]

The sounds [j], [w], [ɹ] and [l], the initial sounds of *your*, *war*, *raw* and *law* respectively, are produced with little or no obstruction of the airstream in the mouth. They are the **approximants**, which are created by an approximation of the tongue towards a vocal tract landmark. In Australian English (and most varieties of New Zealand English) all the approximants except [l] must be followed directly by a vowel.

In articulating [j] or [w] the tongue moves in a gliding fashion either towards or away from a neighbouring vowel. [j] and [w] are sometimes called **semivowels** because, like vowels, they have little vocal tract constriction.

[j] is a palatal approximant where the blade of the tongue is raised towards the hard palate in a position almost identical to that in producing the vowel sound in the word *eat*. In pronouncing *you*, the tongue moves rapidly from the [j] to the following vowel.

[w] is a **labiovelar** approximant produced by raising the back of the tongue towards the velum and simultaneously rounding the lips. In most varieties of English *which* and *witch* are homophones (words that have different meanings/spelling but are pronounced in the same way) pronounced with the voiced labiovelar approximant [w]. In some varieties of English, speakers have different pronunciations for these words. The labiovelar approximant in *which* is sometimes pronounced as voiceless [ʍ] and in *witch* it is voiced [w]. The position of the tongue and the lips for [w] is similar to that for producing the vowel sound in *look*, but the [w] is an approximant because the tongue moves quickly to the vowel that follows.

As mentioned earlier, the *r* sounds that occur in varieties of English and other languages differ somewhat from each other. [ɹ] may be considered a postalveolar approximant in Australian and New Zealand English. A common variant has the tongue tip raised to just behind the alveolar ridge, but produces little obstruction to the airstream; [ɹ] can also be produced with a 'bunched' articulation where the tongue tip is down but the body of the tongue is bunched towards the palate. [ɹ] is also like [j] and [w] in that it must always be followed directly by a vowel in Australian and most varieties of New Zealand English, in words like *rid* [ɹɪd], *brick* [bɹɪk] and *marriage* [mæɹɪʤ]. Australian and New Zealand English are *non-rhotic* dialects, where *r* sounds don't occur before a pause or a consonant. The *r* in the spelling of words like *for* and *fort* is not pronounced. However, in the stream of speech, if a word like *for* finds itself before a word that begins with a vowel, as in *for a while*, then the *r* may be produced. This is a liaison phenomenon called *linking r*.

[ɹ] is very sensitive to regional variation and to varying phonetic context. In many varieties of English (such as Irish English, Canadian English and many other North American varieties), [ɹ] is not subject to the restriction that it must immediately precede a vowel, and in such varieties both *for* and *fort* would contain the sound [ɹ]. These varieties of English are called *rhotic* varieties. In some languages the *r* may be a trill (represented by the IPA symbol [r]). Trills occur in many contemporary languages, such as Spanish (the word for 'dog' is *perro*, which contains an alveolar trill).

In addition to the alveolar trill, uvular trills also occur in some languages, for example in French and Portuguese. A uvular trill is produced by vibrating the uvula. The uvular trill [ʀ] may occur as the first sound in the word *rouge* for some speakers of French. In other languages the *r* is produced as a single **tap** of the tongue against the roof of the mouth instead of a series of vibrations or trills. In Spanish, both the alveolar trill [r] and the alveolar tap occur. Substituting one for the other in certain contexts will produce a different word. Some speakers of British English pronounce the *r* in the word *very* with a tap. The IPA symbol for the alveolar tap is [ɾ]. It sounds like a very fast *d*. Most speakers of American English, and increasingly many Australian

approximants
Continuant sounds in which the articulators allow air to flow through the vocal tract without occluding or substantially constricting the flow of air, e.g. [j], [w], [ɹ] and [l] in English, where the first three are central approximants and [l] is a lateral approximant.

semivowels
The class of sounds, such as [j] and [w], that are articulatorily similar to vowels but function as consonants; see also **glides**.

labiovelar
A sound articulated by simultaneously raising the back of the tongue towards the **velum** and rounding the lips.

tap
A sound in which the tongue quickly touches the roof of the mouth.

English speakers, produce a tap instead of a [t] or [d] in words such as *latter* and *ladder*. For many speakers, these pairs are pronounced identically in normal conversational style ([lærə]).

In the production of the sound [l], the front of the tongue makes contact with the alveolar ridge, but the sides of the tongue are down, permitting the air to escape laterally. There is some obstruction of the airstream in the mouth but not enough to cause friction. [l] is usually referred to as a lateral sound. Laterality is a characteristic of manner of articulation. The opposite of lateral is **central**, and all other English sounds are central because the air flows along a central channel.

central
A sound in which air flows along a central pathway through the mouth to the outside air.

In some varieties of English, including Australian English, [l] is strongly affected by its position within a word. When [l] occurs at the end of a word (as in *feel*), the back of the tongue is pulled back, resulting in a *dark* quality to the sound. This type of *l* is known as dark or *velarised l*. There is a special IPA symbol for velarised *l* [ɫ]. When *l* occurs at the beginning of a word (as in *leaf*), the tongue tip touches the alveolar ridge but the back and sides of the tongue are lowered. This sound is known as clear *l* [l]. Clear and dark *l* ([l] and [ɫ]) are both variants of *l*.

Some languages may avoid [ɹ] and [l] entirely or have just a single *l*. The Cantonese dialect of Chinese has a single *l*. Japanese, on the other hand, lacks an *l* but has an *r*. These differences make some English words difficult for Cantonese or Japanese speakers to pronounce. Other differences make these languages difficult for English speakers to pronounce.

Phonetic symbols for Australian English consonants

We are now capable of distinguishing all of the consonant sounds of English via the properties of voicing, nasality, place and manner of articulation; for example, [f] is a voiceless, (oral) labiodental fricative, and [n] is a (voiced) nasal, alveolar stop. The parenthesised features are usually not mentioned since they are redundant; sounds are considered oral unless nasal is specifically mentioned, and nasals are considered voiced in English. **Table 2.6** lists the English consonants by their **phonetic properties**. The manner of articulation is represented in the rows and the place of articulation is in the columns. Leaving aside the vowel sounds for a moment, the sounds included in **Table 2.6** are sufficient to distinguish words in English from one another. Examples of words in which these sounds occur are given in **Table 2.7**.

phonetic property
A feature of a segment (e.g. voiced, nasal, alveolar) that distinguishes that segment from another.

Table 2.6 Minimal set of consonant symbols used to differentiate words in Australian English

	Bilabial	Labiodental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Stop								
Voiceless	p			t			k	
Voiced	b			d			ɡ	
Nasal	m			n			ŋ	
Fricative								
Voiceless		f	θ	s	ʃ			h
Voiced		v	ð	z	ʒ			
Affricate								
Voiceless					ʧ			
Voiced					ʤ			
Lateral approximant				l				
Central approximant	w*				ɹ	j	w*	

*[w] is considered to be a double articulation that is both labial and velar, i.e. labiovelar.

Table 2.7 Examples of consonants in English words

	Bilabial	Labiodental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Stop (oral)								
Voiceless	pie			tie			kite	
Voiced	buy			die			guy	
Nasal (voiced)	my			night			sing	
Fricative								
Voiceless		fie	thigh	sue	pressure			high
Voiced		vie	thy	zoo	measure			
Affricate								
Voiceless					chime			
Voiced					jive			
Lateral approximant				light				
Central approximant	wipe*				right	yank	wipe*	

*[w], as discussed above, has a labiovelar place of articulation.

The full IPA chart is reproduced in Figure 2.6. In the chart of *pulmonic* consonants (those that have airflow from the lungs) at the top, all the consonants that we have discussed previously are represented according to their place, manner and voicing. You will notice that in the full IPA chart there are many other consonant sounds that occur in the languages of the world, including the *non-pulmonic* sounds (**clicks**, **ejectives** and **implosives**), which we have not discussed because they are beyond the scope of this introductory textbook. Information about them can be found in the suggested readings at the end of the chapter.

click
A speech sound produced by an articulation that involves sucking air into the mouth through the activity of the tongue, e.g. the sound often spelt *tsk* in English is an example of a click sound.

ejective
A speech sound produced when air in the mouth is pressurised by an upward movement of the larynx, then released.

implosive
A speech sound that involves the downward movement of the larynx forcing air into the mouth.

> By infinitesimal movements of the tongue countless different vowels can be produced, all of them in use among speakers of English who utter the same vowels no oftener than they make the same fingerprints.
>
> George Bernard Shaw, Preface to *Pygmalion*, 1912

Vowels

Vowels are produced with relatively little impedance to the air flowing through the oral cavity compared to consonants. The quality of a vowel depends on the shape of the vocal tract as the air passes through. Different parts of the tongue may be high or low in the mouth and to the front or to the back, the lips may be spread or rounded, and the velum may be raised or lowered.

Vowel sounds carry pitch and loudness – you can sing vowels or shout vowels. They may be long or short sounds. Vowels can stand alone – they can be produced without consonants before or after them. You can say the vowels of *back* [bæk] or *book* [bʊk], for example, without the surrounding [b] or [k], but you cannot say a [b] or a [k] alone without at least a little bit of vowel sound.

Phoneticians (speech scientists) examine vowel sounds using a range of different technologies that allow us to determine their acoustic and physiological characteristics. We discuss this topic in Chapter 8. In the present chapter we will describe vowels by their basic articulatory features, just as we described consonants. In the same way that we say a [d] is produced in the mouth by raising the tongue tip to the alveolar ridge, we say an [ɪ] (the vowel in *bit*) is produced by raising

Figure 2.6 **The International Phonetic Alphabet**

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2015)

CONSONANTS (PULMONIC)

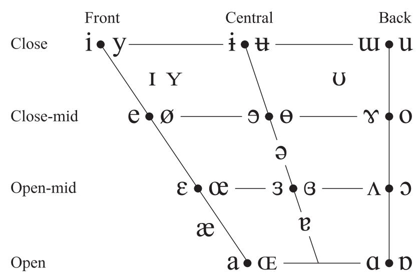
	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

Clicks	Voiced implosives	Ejectives
ʘ Bilabial	ɓ Bilabial	ʼ Examples:
ǀ Dental	ɗ Dental/alveolar	pʼ Bilabial
ǃ (Post)alveolar	ʄ Palatal	tʼ Dental/alveolar
ǂ Palatoalveolar	ɠ Velar	kʼ Velar
ǁ Alveolar lateral	ʛ Uvular	sʼ Alveolar fricative

VOWELS



Where symbols appear in pairs, the one to the right represents a rounded vowel.

OTHER SYMBOLS

- ʍ Voiceless labial-velar fricative
- w Voiced labial-velar approximant
- ɥ Voiced labial-palatal approximant
- ʜ Voiceless epiglottal fricative
- ʢ Voiced epiglottal fricative
- ʡ Epiglottal plosive
- ɕ ʑ Alveolo-palatal fricatives
- ɺ Voiced alveolar lateral flap
- ɧ Simultaneous ʃ and x

Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary. t͡s k͡p

DIACRITICS Some diacritics may be placed above a symbol with a descender, e.g. ŋ̊

̥ Voiceless	n̥ d̥	̤ Breathy voiced	b̤ a̤	̪ Dental	t̪ d̪
̬ Voiced	s̬ t̬	̰ Creaky voiced	b̰ a̰	̺ Apical	t̺ d̺
ʰ Aspirated	tʰ dʰ	̼ Linguolabial	t̼ d̼	̻ Laminal	t̻ d̻
̹ More rounded	ɔ̹	ʷ Labialized	tʷ dʷ	̃ Nasalized	ẽ
̜ Less rounded	ɔ̜	ʲ Palatalized	tʲ dʲ	ⁿ Nasal release	dⁿ
̟ Advanced	u̟	ˠ Velarized	tˠ dˠ	ˡ Lateral release	dˡ
̠ Retracted	e̠	ˤ Pharyngealized	tˤ dˤ	̚ No audible release	d̚
̈ Centralized	ë	~ Velarized or pharyngealized	ɫ		
̽ Mid-centralized	e̽	̝ Raised	e̝ (ɹ̝ = voiced alveolar fricative)		
̩ Syllabic	n̩	̞ Lowered	e̞ (β̞ = voiced bilabial approximant)		
̯ Non-syllabic	e̯	̘ Advanced Tongue Root	e̘		
˞ Rhoticity	ɚ a˞	̙ Retracted Tongue Root	e̙		

SUPRASEGMENTALS

- ˈ Primary stress — ˌfoʊnəˈtɪʃən
- ˌ Secondary stress
- ː Long — eː
- ˑ Half-long — eˑ
- ̆ Extra-short — ĕ
- | Minor (foot) group
- ‖ Major (intonation) group
- . Syllable break — ɹi.ækt
- ‿ Linking (absence of a break)

TONES AND WORD ACCENTS

LEVEL		CONTOUR	
e̋ or ˥	Extra high	ě or ˩˥	Rising
é ˦	High	ê ˥˩	Falling
ē ˧	Mid	e᷄ ˦˥	High rising
è ˨	Low	e᷅ ˩˨	Low rising
ȅ ˩	Extra low	e᷈ ˧˦˧	Rising-falling
ꜜ	Downstep	↗	Global rise
ꜛ	Upstep	↘	Global fall

the body of the tongue towards the palate. For [æ] (the vowel in *cat*) the jaw is low and the tongue is low in the mouth with the body of the tongue forward. If you watch a real-time X-ray or MRI video of the side view (midsagittal plane) of the vocal tract during speech, you will see that various parts of the tongue rise and fall, move forwards and backwards in the mouth, and you will also see the jaw changing in height and the lips moving. These are the dimensions over which vowels are produced. You will also see the velum opening and closing the passage from the oral to the nasal cavity. There are three main questions that we use to help us classify English vowels:

- How high or low is the tongue in the mouth?
- How forward or back is the tongue in the mouth?
- Are the lips rounded (pursed) or unrounded?

There are other questions too and we will discuss those as we continue to describe the characteristics of vowels.

> *Higgins:* Tired of listening to sounds?
> *Pickering:* Yes. It's a fearful strain. I rather fancied myself because I can pronounce twenty-four distinct vowel sounds, but your hundred and thirty beat me. I can't hear a bit of difference between most of them.
> *Higgins:* Oh, that comes with practice. You hear no difference at first, but you keep on listening and presently you find they're all as different as A from B.
>
> George Bernard Shaw, *Pygmalion*, 1912

Tongue position

The IPA provides a set of reference symbols for describing vowel sounds. In **Figure 2.6** you can see that the vowel chart (on the right side of the table) is in the shape of a quadrilateral that indicates the height and fronting of the vowels. On this chart, vowels are generally arranged in pairs. The symbol on the left of the pair indicates an unrounded vowel and the symbol on the right of the pair represents a rounded vowel at the same place of articulation. When choosing symbols for the vowel sounds of any particular language or dialect, linguists select from this reference set according to how the vowels of the language or dialect are produced. In this way the vowel system of any particular language can be indicated. You can see in the IPA reference vowel chart that the highest (close) most fronted unrounded vowel is [i]. The highest (close) most back (retracted) rounded vowel is [u]; the lowest (open) most back unrounded vowel is [ɑ]; and the lowest (open) most fronted unrounded vowel is [a]. These IPA symbols are standard reference points for the description of vowels.

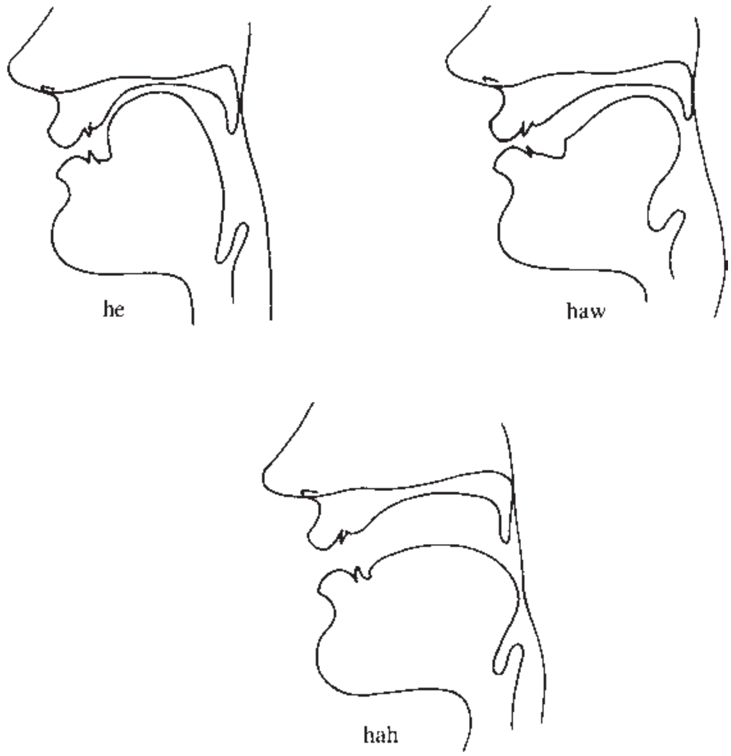
As discussed earlier in this chapter, there are two main systems in use for transcribing Australian English vowels. The HCE system of symbols has been designed by selecting IPA vowel symbols that closely correspond to typical Australian English pronunciation and these will be used in the illustrations of Australian English vowels that follow. The MD system of symbols is based on a British English standard and can be used to represent Australian English in a way that shows how it equates to a standard form of British English. (Refer to **Table 2.1** for comparison between the MD symbols and the HCE set of symbols for Australian English.) In our discussions of vowels from other languages we will use the vowel symbols most appropriate for those languages.

The upper two diagrams in **Figure 2.7** show that the tongue is high in the mouth in the production of the Australian English vowels in the words *he* (as in *peat*) and *haw* (as in *port*). In *he* the tongue is raised towards the front of the mouth; in *haw* it is raised towards the back. If you prolong the vowels of these words you may be able to feel the raised part of your tongue. These are both high vowels in Australian English. They are also long vowels, and this feature is included in the HCE transcription by using the **diacritic** for vowel **length** [ː]. You might also notice that the lip shape varies between these vowels. In *haw* the lips are rounded and in *he* they are unrounded.

diacritics
Additional markings attached to (or adjacent to) IPA symbols used to specify various phonetic properties, such as **length**, **tone**, **stress** and **nasalisation** to name a few.

length
A feature referring to the duration of a segment. Two sounds may contrast in length, e.g. in Japanese, the *k* in the middle of the word *kakko*, 'parenthesis', is long but in *kako*, 'past', it is short.

Figure 2.7 **Position of the tongue in producing the vowels in *he, haw* and *hah***

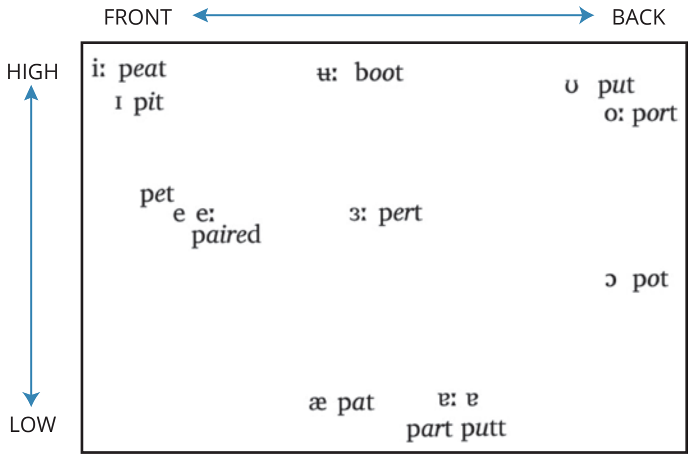


To produce the vowel sound of *hah* (as in *part*), the tongue is low in the mouth, as the lower diagram in **Figure 2.7** shows. The reason a doctor examining your throat may ask you to say 'ah' is that the jaw is open and the tongue is low, allowing the back of the throat to be more easily seen. This vowel is therefore a low vowel. In Australian English, the vowel in *hah* is low but neither front nor back. It is instead centrally located and best represented by the IPA symbol [ɐː]. **Figure 2.7** shows some of the Australian English vowels based loosely on tongue position. The position of the vowel relative to the horizontal axis is a measure of the vowel's front–back dimension. Its position relative to the vertical axis is a measure of height. The MD symbol for this sound is [a] using an IPA symbol for a front vowel (see **Figure 2.6**) and is therefore not the best symbol for describing the Australian English long low central quality. To produce the vowel in the word *putt*, the tongue is low and central in a similar place to that of *part*. These two vowels differ from one another by length. Compare the long vowel of *part* with the short vowel of *putt*. If you elongate the vowel in *putt* you will end up with *part*. **Figure 2.8** also shows that the vowel sound in the word *boot* is a high vowel, which is also produced with the tongue between the front and the back. It is a long high *central* vowel and is best represented with the symbol [ʉː] in Australian English. Many other varieties of English use a long high *back* vowel sound, so [u] is used to represent their productions.

The vowels in the words *pit* and *put* are similar to those in *peat* and *port*, but they are short vowels, whereas those in *peat* and *port* are long vowels.

The vowel [æ] in *pat* is produced with the tongue low in the mouth and towards the front. Say 'hap, harp, hap, harp, hap, harp …' and you should feel your tongue moving forward and back in the low part of your mouth. Therefore, [æ] is a low front vowel as opposed to the vowel of *part* which is a low central vowel.

Figure 2.8 An illustration of some Australian English vowel positions with illustrative words and HCE symbols used to represent the vowels



The vowels in *pet* and *pot* are mid vowels. They are produced by placing the tongue in positions between the high and low vowels just discussed. *Pet* is at the front and *pot* is at the back.

The schwa vowel [ə], which occurs as the first sound in *adapt* [ədæpt] or the final sound of *differ* [dɪfə], is articulated with the tongue in a more or less neutral position between the extremes of high–low, front–back. Schwa is used only to represent unstressed vowels (to be discussed below). The long vowel in *pert* occurs in a central position at mid height in a similar place to schwa.

Lip rounding

Vowels also differ according to whether the lips are **rounded** or unrounded. The vowels in the Australian English and New Zealand English words *boot*, *put*, *port* and *pot* all have lip rounding. You can get a feel for the rounding by prolonging the word *who* as if you were an owl: *whoooooooooo*. Now say *cheese*, only say it with a prolonged vowel: *cheeeeeeeeeeese*. The long high front [iː] in *cheese* and *peat* is unrounded, with the lips in the shape of a smile. The low vowel [ɐː] in the words *part*, *bar*, *bah* and *aha* occurs without lip rounding. **Front vowels** are not usually rounded in English. This is not true of all languages. French and Swedish, for example, have both front and back rounded vowels. The French word *lu* 'read' has a high front rounded vowel as does the Swedish word *ryta* 'roar'. In English, the high back unrounded vowel [ɯ] does not occur, but in Turkish, Japanese, Thai and many other languages, this vowel is part of the inventory of sounds.

rounded vowel
A vowel sound produced with rounded lips.

front vowel
A vowel sound in which the tongue is positioned forward in the mouth.

All the vowels mentioned in the previous section are simple vowels called **monophthongs**. They can be prolonged without having to change the tongue position during the production of the vowel. Of course, when monophthongs occur with surrounding consonants there will be changes in articulation associated with the vowel–consonant overlap, but these effects are not inherent to the vowel itself, which can be produced with a relatively stable articulation in the absence of surrounding consonants.

monophthong
A simple vowel produced with a relatively stable articulatory position in the absence of surrounding consonants, e.g. *e* in *bed*.

Diphthongs

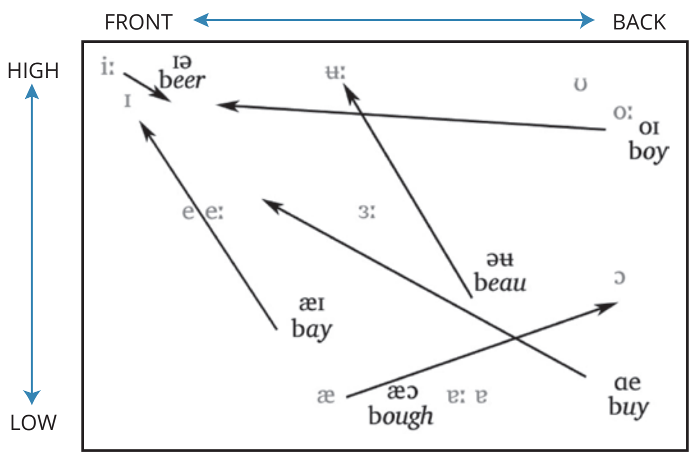
A **diphthong** is a vowel that requires changes to the articulatory gestures during its production. Diphthongs are used in many languages, including English. They are usually represented by two vowel symbols to indicate the start and end points of the gliding gesture. It must be stressed, though, that a diphthong is a single vowel and *not* two vowels joined together. Diphthongs are classified according to the type of gesture that occurs. Diphthongs in which the tongue moves

diphthong
A dynamic vowel produced by the movement of the articulators from one position to another, as in *buy*, *bough*, *bay*.

from a low to a high position are known as rising diphthongs. Australian and New Zealand English have five rising diphthongs. They occur in the words *buy*, *bay*, *boy*, *bough* and *beau*.

Diphthongs where the tongue movement is from a high to a lower position are called falling or centring diphthongs. In Australian English there are two vowels that are sometimes (but not always) produced as centring diphthongs. These are the vowels in *lair* and *leer*.[14] The vowel in *lair* ([eː] in HCE and [ɛə] in MD) is very often produced as a long monophthong instead of a diphthong and that's why the HCE transcription system represents it with a single symbol followed by a length diacritic. It has the same position in the vowel space as [e] but it is a long vowel, whereas [e] is a short vowel (see **Figure 2.8**). If you compare the words *laird* and *led*, the first word has a long vowel [eː] and the second a short vowel [e]. There is a lot of variation in how the vowel [eː] is produced. Sometimes it can sound much more like a diphthong, particularly if it is at the end of a phrase. [ɪə] in *leer* is also often a monophthong but not as regularly as the vowel in *lair*. **Figure 2.9** illustrates the direction of the gliding component of the diphthong through the vowel space for Australian English. The HCE symbols for the monophthongs have been included in this figure to show the relationship between the monophthongs and the diphthongs.

Figure 2.9 The direction that the Australian English diphthongs move through the acoustic vowel space with illustrative words and HCE symbols used to represent the diphthongs



Nasalisation of vowels

Vowels, like consonants, can be produced with a raised velum, which prevents the air from escaping through the nose, or with a lowered velum, which permits air to pass into the nasal cavity. When the nasal passages are blocked by the raised velum, *oral* vowels result; when the nasal passages are open by the lowered velum, *nasal* (or *nasalised*) vowels result. In English, nasalised vowels occur before nasal consonants and oral vowels occur in all other places. Nasalisation of vowels in English therefore depends on the characteristics of the surrounding consonants (i.e. the phonetic context). The English words *bin*, *bone*, *bing*, *boom*, *bam* and *bang* are examples of words that contain nasalised vowels because the vowels all precede nasal consonants.

In languages like French, Polish and Portuguese, nasalisation of vowels is not dependent on phonetic context. Nasal vowels occur without a following nasal consonant in the phonetic sequence. The French word meaning 'sound' is *son* [sõ]. The *n* in the spelling is not pronounced but indicates that the vowel is nasal. To show the nasalisation of a vowel in a phonetic transcription, the nasal diacritic [˜] (tilde) is placed over the vowel. Nasalisation will be discussed in more detail in Chapter 3.

Vowel length

In Australian English, as we have seen, there is a length difference between some vowels that creates an important linguistic contrast, for example, between the vowels in the pairs of words *part/putt* and *laird/led*. The length of these vowels is explicitly indicated in the transcription for monophthongs in the HCE system of symbols. Diphthongs are also long vowels – but it is not necessary to include the length marker because the two vowel symbols of the diphthong indicate the extra length. Length differences between vowels also occur in other languages. In Japanese, the word *biru* [biɾɯ][15] with a short *i* means 'building', but with a long *i* as in *biiru* [biːɾɯ] the meaning is 'beer'. In some varieties of English, longer vowels are called **tense** vowels and shorter vowels are **lax vowels**.

tense/lax vowels
Features that divide vowels into two classes based on length; tense vowels are generally longer in duration than the corresponding lax vowels.

Prosodic features

Length, *pitch* and *loudness* combine in complex ways to add meaning to words and phrases. These three characteristics of speech are our perceptual response to the acoustic features of duration, frequency and amplitude, respectively. They are used to indicate **stress** and interact to create rhythm and melody. These features are **prosodic**, or **suprasegmental**, because they occur over and above the segmental values of voicing, place or manner of articulation, hence the *supra* in *suprasegmental*. The term *prosodic* comes from poetry, where it refers to the metrical structure of verse. One of the essential characteristics of poetry is the placement of stress (accent) on particular **syllables**, which defines the versification of the poem. Syllables are phonological units that are composed of one or more speech sounds, one of which must be a vowel or vowel-like element in the phonetic output. Words are composed of one or more syllables.

stress/stressed syllable
A **syllable** with relatively greater length, more extreme values of pitch and/or (to a lesser extent) increased loudness than other surrounding syllables, and therefore perceived as prominent; also called **(prosodic) accent**.

prosodic/suprasegmental feature
Aspects of speech beyond the speech segment, including rhythm, stress and intonation patterns.

As we have seen for vowels, sometimes length is an important feature, particularly where speech sounds that are identical in their other features differ in length (duration). This type of vowel length difference occurs in Australian English and in many other languages, such as Japanese and Finnish. Languages like Japanese, Finnish and Italian also have long consonants that serve to differentiate words. When a consonant is long, or doubled, the closure/obstruction phase is prolonged. These sounds are called **geminates**. In Japanese, the word *saki* [saki], pronounced with a short *k*, means 'ahead'. But the word *sakki* [sakːi], which is pronounced with a long *k* – prolonging the velar closure – means 'before'.

syllable
A phonological unit composed of one or more speech sounds, one of which must be a vowel or vowel-like element in the phonetic output. Words are composed of one or more syllables.

In English, consonant length does not change a word. You could say in English 'She's ssssso happy!' to emphasise the magnitude of your friend's joy, prolonging the s-articulation, but the actual meaning of the word *so* is not changed. In English, the length of speech sounds can differ from one another according to the prosodic characteristics of the utterance. For example, sounds at the ends of phrases are longer than those at the beginning of phrases, and those in stressed (accented) syllables are longer than those in unstressed syllables. However, these length effects do not by themselves change the basic meaning of the phrase. When we speak, we also change the pitch of our voice. Pitch depends on how fast the vocal folds vibrate; the faster they vibrate, the higher the pitch. Pitch is our perception of the physical frequency of vibration. If the larynx is small, as it is in women and children, the shorter vocal folds vibrate faster and the pitch is higher, all other things being equal. That is why women and children have, in general, higher-pitched voices than men. But no matter what size our vocal folds are we can still change the speed at which they vibrate – either making them vibrate more quickly and therefore raising the pitch, or making them vibrate more slowly thereby lowering the pitch. Later, we will discuss tone languages like Mandarin where changing pitch does affect the meaning of individual words.

geminate
A sequence of two identical sounds that differ only in length; the long consonant is denoted either by writing the phonetic symbol twice as in [sakki] or by use of a length diacritic as in [sakːi].

Stress

In many languages, certain syllables in a word are slightly higher (or lower) in pitch and somewhat longer in duration and may also be louder than other syllables in the word. They are the stressed (accented) syllables. The first syllable of the word *défect* (the noun meaning 'a fault') is stressed, whereas in *deféct* (the verb meaning 'to desert a cause or country in favour of another') the second syllable receives greater stress. Stress can be marked in several ways, including by putting an accent mark over the stressed vowel in the syllable, as in *áddict* versus *addícted*. Stress can be indicated in phonetic transcription by a diacritic [ˈ] before the stressed syllable, for example, [ˈædɪkt] versus [əˈdɪktəd].

In English, at least one syllable of each content word (i.e. a noun, verb, adjective or adverb) is usually stressed. French does not have this requirement. When native English speakers attempt to speak French, they often stress syllables where they would be stressed in English, so that they may speak French with an 'English accent'. When French speakers speak English, they may not put stress where a native English speaker would, and that contributes to what English speakers would call a 'French accent'.

Stress can also add meaning to a phrase by changing the focus of the phrase. In such cases a particular syllable in the focus word is said to be *accented*. For example, the sentence 'she's *going* to defect' is highlighting that the action has definitely not yet occurred but is certain to happen in the future. In '*she's* going to defect' the speaker is making it clear that it is a particular female person who is going to defect and not someone else. The two meanings are quite distinct, and the difference is created by the shift in accent.

Tone and intonation

We have already seen how, in English, differences in stress patterns make different words, such as the two *defects*. Pitch, too, can make a difference in certain languages.

Speakers of all languages vary the pitch of their voices when they talk. The effect of pitch on a syllable differs from language to language. In English, it does not matter whether you say *cat* with a high pitch or a low pitch – it will still mean 'cat'. But if you say [ba] with a high pitch in Nupe (a language spoken in Nigeria), it will mean 'to be sour', whereas if you say [ba] with a low pitch, it will mean 'to count'. Languages that use the pitch of individual vowels or syllables to contrast meanings of words are called **tone languages**.

tone language
A language in which the tone or **pitch** on a **syllable** changes the meaning of the word, so that words with identical segments but different tones have different meanings.

register/level tones
A relatively stable (non-gliding) pitch on syllables of tone languages.

contour tone
A **tone** in which the pitch glides from one level to another.

Most languages in the world are tone languages. More than 1000 tone languages are spoken in Africa alone. Many languages of Asia, such as Mandarin Chinese, Burmese and Thai, are tone languages. In Thai, the same string of segmental sounds represented by [naa] (or [na:]) will mean different things if one uses a low pitch, a mid pitch, a high pitch, a falling pitch from high to low, or a rising pitch from low to high. Thai has five linguistic tones. Diacritics are used to represent distinctive tones in the phonetic transcriptions.

There are two kinds of tones. **Register tones** are those where the pitch is level across the syllable. **Contour tones** are those where the pitch changes across the syllable, whether from high to low or vice versa. Thai has three level and two contour tones. Commonly, tone languages will have two or three register tones and possibly one or two contour tones. The following illustrates the five contrastive tones in Thai:

[ˋ] L low tone	[nà:]	a nickname
[¯] M mid tone	[nā:]	rice paddy
[ˊ] H high tone	[ná:]	young maternal uncle or aunt
[ˆ] HL falling tone	[nâ:]	face
[ˇ] LH rising tone	[nǎ:]	thick

In a tone language, it is not the absolute pitch of the syllables that is important, but the relationship among the pitches of different syllables. Therefore, men, women and children, with differently pitched voices, can still communicate in a tone language.

Tones generally have a *lexical* function; that is, they signal a difference between words. But in some languages, tones may also have a *grammatical function*, as in Edo, which is spoken in mid-western Nigeria. The tone on monosyllabic verbs followed by a direct object indicates the tense and transitivity of the verb. Low tone means present tense, transitive, and high tone means past tense, transitive, as illustrated here:

òtà	gbȅ	èbé
Ota	write + PRES + TRANS	book
Ota writes a book.		
òtà	gbế	èbé
Ota	write + PAST + TRANS	book
Ota wrote a book.		

In many tone languages we find a continual lowering of the absolute pitch on the tones throughout an utterance; however, the *relative* pitches remain the same. In the following sentence in Twi, a dialect of Akan spoken in Ghana, the relative pitch rather than the absolute pitch is important.

Kofi searches for a little food for his friend's child.				
kòfí	hwèhwɛ́	áduàŋ	kàkrá mà	ǹ' ádàmfò bá
L H	L H	H L	L H L	L H L L H

The actual pitch of these syllables would be rather different from each other, as shown in the following musical staff-like figure (the higher the number, the higher the pitch):

7		fí											
6				hwɛ́	á								
5	kò							krá					
4			hwè								á		
3						duàŋ	kà						bá
2									mà	ǹ'			
1												dàmfò	

The lowering of the pitch is called **downstep**. In languages with downstep, a high tone that occurs after a low tone, or a low tone after a high tone, is lower in pitch than the preceding similarly marked tone. Notice that the first high tone in the sentence above is given the pitch value 7. The next high tone (which occurs after an intervening low tone) is 6; that is, it is lower in pitch than the first high tone.

downstep
The lowering of the absolute pitch of **tones** during an utterance, during which tones retain their relative values to one another.

This example shows that in analysing tones, just as in analysing segments, it is not necessary to consider all the physical properties of the sound. Only linguistically important features contain useful information – in this case, whether the tone is high or low *in relation to the other pitches*. The absolute pitch is nonessential.

Languages that are not tone languages, such as English, are called **intonation** languages. The pitch contour of the utterance varies, but in an intonation language as opposed to a tone language, pitch is not used to distinguish words from each other. Intonation may affect the meaning of whole utterances, so that *John is here* spoken with falling pitch at the end is interpreted as a

intonation
The pitch contour of a phrase or sentence.

statement, and with rising pitch at the end is likely to be interpreted as a question. We will have more to say about intonation in Chapter 3.

The phonetics of signed languages

Signed languages, like all other human languages, are governed by a grammatical system that includes syntax, morphology and phonology. Signs can be broken down into smaller units analogous to the phonetic features discussed in this chapter. Just as spoken languages distinguish sounds according to place and manner of articulation, so signed languages distinguish signs according to the place and manner in which the signs are articulated by the hands. The signs of Auslan (Australian Sign Language, the majority sign language of Australia's deaf community), for example, are formed by four major features:

- configuration of the hand (handshape)
- orientation of the fingers and palm of the hand with respect to the body, such as whether the fingers and/or palm is oriented up, down, right, left, towards or away from the body
- location of the hands on the body and/or in signing space. 'Signing space' is the area of space extended approximately forearm-distance from the signer's body, from waist to forehead, in which the arms can move comfortably
- movement of the hand and arms on the body and/or in signing space.

To illustrate how a combination of these features make a sign, one Auslan sign meaning *mother* is produced by tapping the forehead with the hand with all of the fingers extended in a flat handshape (the B handshape in the one-handed manual alphabet). It has four features: B *handshape*, an *orientation* with the palm facing the body and the fingers directed upwards, forehead *location*, and a tapping *movement*.

Auslan has over 35 handshapes. Not all signed languages have the same handshapes, just as not all spoken languages share the same places and manners of articulation. For example, the T handshape of American Sign Language does not occur in Auslan. Similarly, Taiwan Sign Language has a handshape formed with all fingers closed in a fist except the ring finger, which is extended. Auslan does not have this handshape.

In Auslan, the orientation of the palm distinguishes the two signs *on* and *true*. In *true*, the side of the B handshape (with the thumb upwards) taps the other open upwards-facing palm whereas for *on* the back of the hand taps the open upwards-facing palm.

The location of signs is defined relative to the body of the signer. For signs that are produced on or near the body, the location is the part of the body the sign is produced at (e.g. chin). For signs that are not produced on or near the body, the location is instead the relative part of the signing space where the sign is produced (e.g. high/low, ipsilateral/contralateral).

A sign's movement can be straight, arcing, turning, or circular movements. Secondary movements include, for example, wiggling or hooking fingers. Signs can also be unidirectional (moving in one direction) or bidirectional (moving in one direction and then back again).

As in spoken language, a change along one of these parameters can result in different lexical items. Just as a difference in voicing or tone can result in different words in a spoken language, a change in handshape, orientation, location or movement can result in different signs with different meanings. For example, in Auslan the sign meaning *brother* differs from the sign meaning *paper* only in movement. Both signs are formed with the fist handshape, but the hands tap together for *paper* but brush past each other in an alternating rubbing action for *brother*.

There are two-handed and one-handed signs. One-handed signs are formed with the speaker's dominant hand, whether left or right. In a single sign, sign languages never use both hands as if they are autonomous articulators (although signers can produce two different signs simultaneously, one on each hand – this is a key difference between spoken and signed languages). The hands always work together in a single sign, just like the different parts of the vocal tract work together to produce sounds in a word. And just as spoken languages have features that do not distinguish different words (e.g. consonant length in English), in Auslan (and probably all signed languages), a difference in handedness does not affect the meaning of the sign.

The parallels that exist in the organisation of sounds and signs are not surprising when we consider that similar cognitive systems underlie both spoken and signed languages, and that both words and signs are the results of actions by parts of the body.

CHAPTER REVIEW

Summary

The science of speech sounds is called phonetics. One of its aims is to provide the set of properties necessary to describe and distinguish all the sounds in human languages throughout the world.

When we speak, the physical sounds we produce are the result of overlapping articulatory gestures that create continuous stretches of sound. These are the physical representations of strings of discrete linguistic segments. Knowledge of a language allows us to separate continuous speech into individual sounds and words.

The discrepancy between spelling and sounds in English and other languages motivated the development of phonetic alphabets in which one letter corresponds to one sound. The major phonetic alphabet in use is the International Phonetic Alphabet (IPA), which includes modified Roman letters and diacritics and provides a way of representing the sounds of all spoken human languages. To distinguish between orthography (spelling) and narrow phonetic transcription we use square brackets [ ].

All typical English speech sounds are created from the movement of air flowing from the lungs through the vocal tract. The air moves through the glottis (i.e. between the vocal folds) in the larynx, up the pharynx, through the oral (and possibly the nasal) cavity and out the mouth or nose. Human speech sounds fall into classes according to their phonetic properties. All speech sounds are either consonants or vowels. Consonants have greater obstruction to the airstream in the vocal tract than do vowels, and the location of this obstruction defines their place of articulation, some of which are bilabial, labiodental, alveolar, postalveolar, palatal, velar, uvular and glottal.

Consonants can be further classified according to their voicing. They may be voiced or voiceless. During the production of voiced sounds, the vocal folds are together and vibrating, whereas in voiceless sounds they are not vibrating. Voiceless stop consonants may also be aspirated or unaspirated. In the production of aspirated sounds, the vocal folds remain apart for a brief time after the stop closure is released, resulting in a puff of air at the time of the release. The final important feature for classifying consonants relates to the manner of articulation, which describes the direction of the airflow and the degree to which it is restricted. The airflow direction may be oral or nasal depending on whether the air flows out through the mouth or the nose, and it may be central or lateral depending on whether it flows along a central passageway or around the sides of the tongue. The different types of constriction to airflow include stops, fricatives, affricates and approximants.

Vowels differ according to the position of the tongue, lips and jaw – whether the tongue is high or low, front or back or between these positions; and whether the lips are rounded or unrounded. Vowels, like consonants, may be nasal or oral, although most vowels in all languages are oral. In Australian English and in many other languages, vowel length is also an important feature.

Pitch, loudness, some aspects of length and stress are prosodic (suprasegmental) features. They are imposed over and above the segmental values of the sounds. In many languages, the pitch of the vowel in the syllable is linguistically important – two words with identical segments may contrast in meaning if the pitch (whether level or gliding) is changed. Such languages are tone languages. There are also intonation languages like English in which the rise and fall of pitch may contrast meanings of sentences. For example, the statement *Mary is a teacher* will usually end with a fall in pitch, but as a question – *Mary is a teacher?* – the pitch will rise.

English and many other languages use stress to distinguish different words, such as *défect* and *deféct*, but also to add focus to a particular part of a phrase, referred to as accent.

Diacritics to specify phonetic properties such as nasalisation, aspiration, length, stress and tone may be combined with the phonetic symbols for more detailed narrow phonetic transcriptions.

In sign languages there are 'phonetic' features analogous to those of spoken languages. In Auslan these are handshape, orientation, movement and location. As in spoken languages, changes along one of these parameters can result in a new word.

In the following chapter, we discuss how speech sounds pattern in language and when it is necessary to use simple broad transcription versus more detailed narrow phonetic transcription.

Exercises

For these exercises you should check with your instructor whether to use the HCE or MD system for the Australian English transcription of vowel sounds.

1 Write the phonetic symbol for the first sound in each of the following words according to the way you pronounce it. The first two answers are given as an example.

e.g.	accident	[æ]
e.g.	psycho	[s]
a	emu	
b	xylophone	
c	knob	
d	junior	
e	these	
f	ukulele	
g	wrench	
h	trap	
i	pneumonia	
j	thirsty	

2 Write the phonetic symbol for the last sound in each of the following words. The first answer is given as an example. (*Hint:* diphthongs should be treated as one sound.)

e.g.	boy	[oɪ]
a	cough	
b	pasta	
c	walked	
d	wreath	
e	fudge	
f	know	
g	match	
h	dogs	
i	long	
j	wash	

3 Write the following words in phonetic transcription, according to your pronunciation. The first two answers are given as an example.

e.g.	knit	[nɪt]
e.g.	look	[lʊk]
a	fellow	
b	greet	
c	marry	
d	Mary	
e	merry	
f	physics	
g	goat	
h	music	
i	abbot	
j	feet	
k	weather	
l	city	
m	wished	
n	'your name'	

4 Following is a narrow phonetic transcription using the HCE symbols of a verse in the poem 'The Walrus and the Carpenter' by Lewis Carroll. The speaker who transcribed it may not have exactly the same pronunciation as you; therefore, there are many correct versions. However, there is one major error in each line that would be a highly unlikely pronunciation for non-rhotic Australian English speakers. The error may consist of an extra symbol, a missing symbol or a wrong symbol in the word. Note that the narrow phonetic transcription that is given has aspiration and nasalisation marked, as well as devoicing indicated by a circle under the symbol, and dark *l* [ɫ]. These features will all be dealt with in the next chapter. None of the errors involves any of these particular features of vowels or consonants.

Write the word in which the error occurs using the correct narrow phonetic transcription, as shown in the example provided in the first line.

e.g.	[θə tʰɑẽm hæz̥ kʰẽm]	[ðə]
a	[ðə wo:ɫɹəz sed̥]	
b	[tə tʰo:lk əv mẽni: θĩŋz̥]	
c	[əv ʃʉ:z ə̃n ʃips]	
d	[ə̃n si:ɫĩŋ wæx]	
e	[əv kʰæbɪgəz ə̃n kʰĩŋz̥]	
f	[ə̃n wɑe ðə si: ɪs boɪɫĩŋ hɔt]	
g	[ə̃n weðər pʰɪg̥z̥ hæv wĩŋz]	

5 The following are all Australian English words written in simplified phonetic transcription. Write the words using normal English orthography.

a [fɪə]
b [no:ti:] [nɔti]
c [θɜ:sti:] [θɜsti]
d [sko:tʃt] [skɔtʃt]
e [ɹɑet] [ɹaɪt]
f [bɹed] [bɹɛd]
g [deɹəlɪkt] [dɛɹəlɪkt]
h [əkskjʉ:səz] [əkskjusəz]
i [lɪp]

6 Write the symbol that corresponds to each of the following phonetic descriptions, then give an English word that contains this sound. The first answer is given as an example.

e.g.	voiced alveolar stop	[d]	*dough*
a	voiceless velar stop		
b	long high front vowel		
c	lateral alveolar approximant		
d	velar nasal stop		
e	voiceless dental fricative		
f	voiced postalveolar affricate		
g	palatal approximant		
h	short low central vowel		
i	high central rounded vowel		
j	voiced bilabial stop		

7 In each of the following pairs of words, the bold italicised sounds differ by one or more phonetic properties (features). Give the symbol for each italicised sound, state their differences and also what properties they have in common.
e.g. h***oo***d – h***oo***t
The ***oo*** in ***hood*** is short, high, back, and round.
The ***oo*** in ***hoot*** is long, high, central, and round.
Both are high round vowels.
- a brea***th*** – bea***th***e
- b mu***ch*** – mu***sh***
- c perc***ei***ve – s***ie***ve
- d kni***f***e – kni***v***es
- e trait***s*** – raid***s***
- f i***m***prove – i***n***trude

8 Write the symbol for the vowel sounds in the italicised words in the following poem entitled 'English', which was published long ago in a British newspaper.

I take it you already *know*
Of *tough* and *bough* and *cough* and *dough*?
Some may stumble, but not *you*,
On *hiccough*, *thorough*, *slough* and *through*?
So now you are ready perhaps
To learn of less familiar traps?
Beware of *heard*, a dreadful *word*
That looks like *beard* and sounds like *bird*.
And *dead*, it's *said* like *bed*, not *bead*
For goodness' sake, don't call it *deed*!
Watch out for *meat* and *great* and *threat*
(They rhyme with *suite* and *straight* and *debt*)
A *moth* is not a moth in *mother*
Nor *both* in *bother*, *broth* in *brother*.

9 For each of the following groups of sounds, state the phonetic feature(s) they all share.
e.g. [p] [b] [m] Feature: bilabial, stop, consonant
- a [g] [p] [t] [d] [k] [b]
- b [ʉː] [ʊ] [oː] [ɔ] [u] [ʊ] [ɔ] [ɒ]
- c [iː] [ɪ] [e] [æ] [i] [ɪ] [ɛ] [æ]
- d [t] [s] [ʃ] [p] [k] [ʧ] [f] [h]
- e [v] [z] [ʒ] [ʤ] [n] [g] [d] [b] [l] [ɹ] [w] [j]
- f [t] [d] [s] [n] [l]

10 What phonetic property or feature distinguishes the sets of sounds in column A from those in column B?

	A	B
a	[iː] [ɪ] [i] [ɪ]	[ʉː] [ʊ] [u] [ʊ]
b	[p] [t] [k] [s] [f]	[b] [d] [g] [z] [v]
c	[p] [b] [m]	[t] [d] [n] [k] [g] [ŋ]
d	[iː] [ɪ] [ʉː] [ʊ] [i] [ɪ] [u] [ʊ]	[ɔ] [æ] [ɐ] [ɒ] [æ] [ʌ]
e	[f] [v] [s] [z] [ʃ] [ʒ]	[ʧ] [ʤ]
f	[iː] [ɪ] [ə] [e] [æ] [i] [ɪ] [ə] [ɛ] [æ]	[ʉː] [ʊ] [oː] [ɔ] [u] [ʊ] [ɔ] [ɒ]

11 Which of the following sound pairs have the same manner of articulation and what is that manner of articulation?

a [s] [t]
b [ʤ] [j]
c [b] [k]
d [k] [θ]
e [s] [ʃ]
f [d] [ɹ]
g [h] [v]
h [j] [l]
i [ŋ] [m]
j [ʃ] [g]

12 **Challenge exercise:**

a Make a list of ordinary, non-exclamatory English words with one syllable that end in [ʃ] preceded directly by the range of vowels of Australian English.
e.g. *fish* [fɪʃ] is such a word. Words ending in [ɪəʃ] are not possible in English.

b What is the specific characteristic of the vowels found in most such words? Are any such words impossible?

c This time look for single syllable words that end in [ŋ] preceded by the vowels of Australian English. What are the restrictions on the vowels that can occur in such words? Do those vowels have particular characteristics?

13 Use the symbols of the IPA to write a sentence that contains at least six different monophthongal vowels and two different diphthongs.

14 The front monophthongs of Australian English [iː, ɪ, e, eː, æ] [i, ɪ, ɛ, ɛə, æ] are all unrounded; however, many languages, such as French, have rounded front vowels. For the following three words in French with rounded front vowels, find out the correct IPA symbols (see **Figure 2.6**) and write the phonetic transcription:

a The word *tu*, 'you', has a high front rounded vowel.
b The word *bleu*, 'blue', has a high midfront rounded vowel.
c The word *heure*, 'hour', has a low midfront rounded vowel.

15 **Challenge exercise:** Using the following data from Standard German, describe the first vowel sound in each word with reference to the parameters of height, rounding, backness found in the IPA vowel chart on the right side of **Figure 2.6**. Also identify whether the vowel is long or short.

a [kɛːfə] beetle
b [bœlə] firecracker
c [pflantsə] plant
d [ɔpfə] victim
e [kiːfə] jawbone
f [ʃmɛʁtsən] ache/pain
g [keːʁən] turn/change direction
h [tyːp] type/guy
i [høːlə] cave

- j [tsuːk] train
- k [tomaːtə] tomato
- l [baːn] railway

16 **Challenge exercise:** Refer to the IPA chart in **Figure 2.6** and provide phonetic symbols for the following pulmonic consonants.

- a voiced velar nasal stop
- b voiceless labial-velar fricative
- c voiceless alveolar lateral fricative
- d voiced labiodental approximant
- e voiced bilabial trill
- f voiceless uvular fricative
- g voiceless bilabial fricative

17 Refer to the IPA chart in **Figure 2.6** to find the description of the following phonetic symbols representing non-pulmonic consonants. Then, using information found via an internet search, list some languages that make use of each speech sound.

- a [!]
- b [ʘ]
- c [ɗ]
- d [ǁ]
- e [ɓ]

Further reading

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Redford, M A (ed.) 2015, *The handbook of speech production*, Wiley Blackwell, Chichester, UK.

Weblinks

- https://www.seeingspeech.ac.uk/ipa-charts – A fantastic resource for visualising speech in motion is the Seeing Speech project, a collaboration between speech scientists from six Scottish universities. This resource allows users to view animations, MRI and ultrasound videos of speech sounds.
- https://web.uvic.ca/ling/resources/ipa/charts/IPAlab/IPAlab.htm – An interactive IPA chart which allows the user to click on a symbol to play the audio of the sound.
- https://enunciate.arts.ubc.ca/linguistics/world-sounds – eNunciate! is a website that allows users to interactively engage with phonetics and the IPA via clickable sounds and videos.
- https://phoible.org – PHOIBLE is a cross-linguistic repository of phonological inventory data which is searchable for aspects of language phonologies including phoneme inventories, feature sets. It incorporates 3020 inventories and contains 3183 segments found in 2186 languages.
- https://www.internationalphoneticassociation.org – This is the official webpage for the International Phonetic Association.
- https://arts.unimelb.edu.au/research-unit-for-indigenous-language/training/australian-indigenous-languages/sounds-of-aboriginal-languages – The University of Melbourne Research Unit for Indigenous Languages video series on the sounds of Australian Aboriginal languages.
- http://sail.usc.edu/span/index.html – The University of Southern California SPAN – Speech production and Articulation Knowledge Group website.
- https://forensicphonetics.com.au – This website has information about phonetics and the law.

Endnotes

1 Moran, S and McCloy, D (eds) 2019, PHOIBLE 2.0. Jena: Max Planck Institute for the Science of Human History. (Available online at http://phoible.org, Accessed on 30 September 2020)

2 Proctor, M, Bresch, E, Byrd, D, Nayak, K and Narayanan, S 2013, 'Paralinguistic mechanisms of production in human "beatboxing": A real-time magnetic resonance imaging study', *Journal of the Acoustical Society of America*, 133: 1043–1054.

3 Sociophonetics examines the relationships between phonetic variation, social groups and social functions. Di Paolo, M and Yaeger-Dror, M 2011 *Sociophonetics: A Student's Guide*, Routledge, London. There are also applied areas of phonetics such as forensic phonetics, which is the application of phonetic methods for legal purposes (https://forensicphonetics.com.au/)

4 Zimmer, B 2008, '"Ghoti" before Shaw', *Language Log*, 23 April https://languagelog.ldc.upenn.edu/nll/?p=81

5 Mitchell, A 1946, *The pronunciation of English in Australia*, Angus and Robertson Publishers, Sydney.

6 Harrington, J, Cox, F M and Evans, Z 1997, 'An acoustic phonetic study of broad, general and cultivated Australian English vowels', *Australian Journal of Linguistics*, 17: 155–184.

7 See also Cox, F M 2008, 'Vowel transcription systems: An Australian perspective', *International Journal of Speech-Language Pathology*, 10: 327–333.

8 Bauer, L, Warren, P, Bardsley, D, Kennedy, M and Major, G 2007, 'New Zealand English', *Journal of the International Phonetic Association*, 37: 97–102

9 Note that a narrow phonetic transcription of these words may include some additional detail.

10 The MRI images were collected at the Centre of Advanced MRI, University of Auckland between June 2010 and June 2011, and were used as the basis of the analysis included in the following conference paper: Watson, C I 2014, 'Mappings between vocal tract area functions, vocal tract resonances and speech formants for multiple speakers', Proceedings of the Annual Conference of the

International Speech Communication Association, INTERSPEECH, 1993–1997.

11 These variants of speech sounds are called allophones and they will be discussed in detail in Chapter 3.

12 The palatal stop in Australian Aboriginal languages is sometimes considered to be closer to an alveopalatal place of articulation [ȶ]. For details of Yindjibarndi consonants see Tabain, M and Butcher, A 1999, 'Stop consonants in Yanuwa and Yindjibarndi: Locus equation data', *Journal of Phonetics*, 27: 333–357.

13 The University of Melbourne Research Unit for Indigenous Languages video series on the sounds of Australian Aboriginal languages, https://arts.unimelb.edu.au/research-unit-for-indigenous-language/training/australian-indigenous-languages/sounds-of-aboriginal-languages

14 The word lure is sometimes produced with the centring diphthong [ʊə], but this vowel is not often used by young people in Australia today. A word like lure is more likely to be pronounced with two separate vowels rather than a centring diphthong.

15 [ɾ] is the symbol for the alveolar tap; [ɯ] is the symbol for the high back unrounded vowel.

3 Phonology: the sound patterns of language

[People] know by a sort of instinct which differences between speech sounds are capable of distinguishing words in their own languages, and as a rule they do not notice other phonetic differences which may exist but which are not capable of distinguishing words.

Daniel Jones, The history of the meaning of the term 'phoneme', 1957

Phonology is the study of telephone etiquette.

A high school student[1]

Learning objectives

After reading Chapter 3, you should be able to:

- explain the distinction between phonemes and allophones and include examples of minimal pairs and complementary distribution to illustrate
- identify a set of features that can be used to deconstruct speech sounds
- show how the relationship between abstract representations and surface forms can be considered rule-based in some phonological theories
- describe the processes required to conduct a simple phonemic analysis
- show that languages of the world differ with regard to their phonotactic features and constraints
- explain how the production of morphemes can vary according to phonological context
- illustrate the difference between intonation languages and tone languages
- identify components of the syllable and illustrate word and sentence stress
- show an awareness that there are different theories about how phonology works and that ongoing research is needed to thoroughly test the predictions of these theories.

Which do you think is greater: the number of languages in the world or the number of speech sounds in all those languages? There are thousands of languages, but only hundreds of speech sounds, some of which we discussed in the previous chapter. Even more remarkable is that only a few dozen features, such as *voicing* or *bilabial* or *stop*, are needed to describe every speech sound that occurs in every human language.

Why then do languages sound so different? One reason is that the sounds form different patterns in different languages. English has nasalised vowels, but only in syllables with nasal consonants. French has nasal vowels with or without nasal consonants. English words cannot begin with the speech sound that occurs at the end of the word *song* – the velar nasal [ŋ] – but Vietnamese words can. The common Vietnamese name spelt *Nguyen* begins with this sound, and one of the reasons English speakers may have difficulty pronouncing this name accurately is that it does not follow the English sound pattern.

The fact that a sound such as [ŋ] is difficult for an English speaker to pronounce at the beginning of a word but easy for a Vietnamese speaker means that there is no general notion of difficulty of articulation that can explain all of the sound patterns of particular languages. Rather, our perception of how easy or difficult certain sounds and sound combinations are depends on the sound patterns of our own language.

Phonology is the study of the way speech sounds form patterns. These patterns may be as simple as the fact that English syllables cannot begin with the velar nasal [ŋ], or as complex as why the *g* is silent in *si**g**n* but is pronounced in the related word *si**g**nature*. To see that this is a pattern and not a one-off exception, consider the *n* in *autum**n*** and *autum**n**al*, or the *b* in *bom**b*** and *bom**b**ard*.

As discussed in Chapter 1, the word *phonology* refers to the linguistic knowledge (often unconscious) that speakers have about the sound patterns of their language and to the linguistic description of that knowledge. Therefore, it is like the way we define grammar in Chapter 1: your mental knowledge of your language or a linguist's description of that knowledge.

Your phonology gives you the ability to identify speech sounds and combinations from your own language and recognise others as different from your own language. It tells you whether sound sequences make an actual word, like *black;* or a nonword, like *blick*; or whether a sequence of sounds do not form a word (asterisked), like **lbick*. It also explains why certain phonetic features are important in identifying a word; for example, in English, voicing as in *pat* versus *bat* is important, while other features, such as nasalisation of vowels, are not crucial to identifying a word as described in Chapter 2. Nasalisation is, however, important in Portuguese, where the word *pão* with a nasalised vowel means 'bread' and *pao* without the nasalisation means 'stick'.

Phonemes: the phonological units of language

> In the physical world the naive speaker and hearer actualise and are sensitive to sounds, but what they feel themselves to be pronouncing and hearing are 'phonemes'.
>
> Edward Sapir, *The Psychological Reality of Phonemes*,1933

In this section we discuss the notions of phoneme and allophone. **Phonemes** are the sounds that speakers identify as important in the creation of words in their language. Native speakers of English know that the sounds represented by the letters *t*, *i* and *k* are important for creating the word *tick*, and they would agree that the first sound in *tick*, the second in *stick* and the last sound in *kit* are all *t* sounds. What they might not realise is that each of these sounds is produced a little differently from the others. The *t* sound that we think of as common to the words *tick*, *stick* and *kit* only exists in the mind of the speaker/listener, because in reality all the *t* sounds in these words are different. This abstract *t* sound is called the phoneme /t/. Phonemes are represented using slant brackets (forward slashes). The phoneme /t/ is an abstraction from all of the different variants of *t* that occur in the language. In a way, it can be thought of as a category label for a group of sounds that occur in the physical flow of speech. Each of the actual productions of the phoneme is called a **phone**. If the characteristics of the phone are predictable from the phonological context, the phone is called an **allophone**. For example, the phoneme /t/ is an abstract category in the mind of the speaker/listener representing a range of allophones, including the voiceless aspirated alveolar stop allophone [t^h] in *tick*, as well as the voiceless unaspirated alveolar stop allophone [t] in *stick*. Note that *allophones* are represented by symbols enclosed in the square brackets required for narrow phonetic transcription [ ], but the symbol for the *phoneme* is enclosed in slant brackets / /.

We know from Chapter 2 that languages differ from one another in the inventories of speech sounds they use to build words. We can identify the inventory of phonemes of any language by finding out which sounds are used to create words. For example, the most important difference between the two words *see* and *saw* occurs at the end of the words. (Remember to think about the sounds here, not the letters.) Native speakers of English would agree that the words *see* and *saw* have the same first consonant sound but differ from one another because the last sound in

phoneme
The abstract representation (in the mind of the speaker/listener) of a contrastive phonological unit in language; an abstraction from the range of variable phonetic realisations that occur in speech production, e.g. the *t* sounds in *stick* and *tick* are two different realisations (pronunciations) of the phoneme /t/.

phone
A particular realisation (pronunciation) of a phoneme, i.e. a sound segment.

allophone
A predictable phonetic realisation (pronunciation) of a phoneme, e.g. [p^h] and [p] are allophones of the phoneme /p/ in English, for example, in words like *pout* and *spout*, respectively.

see is a different vowel from the last sound in *saw*. The difference between the vowel sounds is linguistically important because substituting one of these vowels for the other changes the meaning of the word from *see* to *saw* and vice versa. These vowel sounds **contrast** with each other, and this contrastive difference is called a phonemic difference. The two vowel sounds represent two separate phonemes and they are therefore two of the sounds that make up the inventory of speech sounds in English.

contrast
Different sounds contrast when their presence alone distinguishes between otherwise identical forms, e.g. alternating [f] and [v] in *fine* and *vine* creates two separate words, but alternating [p] and [pʰ] in [spiːk] and [spʰiːk] results in two variant ways of saying *speak*, though the second variant would sound a bit strange.

In *see* and *saw* there is also another difference apart from the different vowel sounds, but one which speakers and listeners are not usually aware of. The consonant sound at the beginning of the word *see* has the lips in a neutral position, but in *saw* (in Australian and New Zealand varieties of English) the lips are in a more rounded position. If you say the two words you should be able to notice the difference in the lip shape. This lip shape difference is not a contrastive one, because it does not affect the identity of the word. You can make the *s* in *see* with rounded lips if you like, and the word is still *see*. The non-contrastive difference between the lip-neutral *s* sound in *see* and the lip-rounded *s* sound in *saw* is an *allophonic* difference rather than a *phonemic* difference. These two non-contrastive sounds are therefore allophones of the phoneme identified by English speakers as /s/.

Narrow phonetic transcription attempts to transcribe some of the detail of the speech sounds, including differences between allophones. Narrow transcription can therefore capture the nature of the two types of *s* at the beginning of *see* and *saw* by making use of a special diacritic [ʷ] to show the lip rounding feature of the *s* in *saw* [sʷoː]. **Broad transcription (phonemic transcription)**, on the other hand, only represents the underlying phonemes, not the detail of speech production output. In broad transcription the sounds at the beginning of *see* and *saw* are represented by a single symbol /s/ because the difference between them is not important in differentiating between the two words. The vowels, however, are represented phonemically by two different symbols indicating the contrastive nature of the difference /siː/ and /soː/. Dictionaries use broad transcription because they only need to represent the general pronunciation features, not the detail of allophonic variation. In this chapter we will use narrow phonetic transcription (in square brackets) when it is necessary to show phonetic detail and broad transcription (in slant brackets) when we want to represent more general aspects of the phonology.

broad (phonemic) transcription
The **phonemic representation** of speech sounds using phonemic symbols (ignoring phonetic details that are predictable), usually given between forward slashes, e.g. /pɪt/, /spɪt/ for *pit*, *spit*, as opposed to the narrow phonetic representation that captures more detail, e.g. [pʰɪt].

Note that in the phonetic transcription of Australian English, we will use the IPA symbols selected specifically for Australian English; that is, the HCE transcription scheme outlined in Chapter 2. It represents Australian English pronunciation with greater accuracy than the alternative MD system.[2] For broad transcriptions that do not require phonetic detail, both HCE and MD transcriptions will be provided, with the latter presented in grey font. See **Table 2.1** in Chapter 2 or the inside front cover for a comparative list of HCE and MD symbols.

Identifying phonemes

The process of substituting one sound for another in a word to see if it makes a difference in meaning is a way to identify the phonemes of a language. Here are 14 words phonetically transcribed for Australian English that differ only in their vowel sound:

beat	[biːt]	[iː]	boot	[bʉːt]	[ʉː]
bit	[bɪt]	[ɪ]	but	[bɐt]	[ɐ]
bet	[bet]	[e]	bought	[boːt]	[oː]
bat	[bæt]	[æ]	bot	[bɔt]	[ɔ]
Bart	[bɐːt]	[ɐː]	Bert	[bɜːt]	[ɜː]
bait	[bæɪt]	[æɪ]	boat	[bəʉt]	[əʉ]
bite	[bɑet]	[ɑe]	bout	[bæɔt]	[æɔ]

Any two of these words form a **minimal pair**, two separate words that differ in just one sound. The two sounds that differentiate the words belong to different phonemes.

From the minimal set of [bVt] words above (where V refers to any vowel) we can infer that this variety of English has at least 14 vowel phonemes. Remember that diphthongs function as single vowel sounds. To that total we can add a phoneme corresponding to [ʊ] resulting from a minimal pair such as book [bʊk] and *back* [bæk] and we can add one for [oɪ] resulting from a minimal pair such as *boy* [boɪ] and *bee* [biː]. We can also add *bare* [beː] and *beer* [bɪə].

Our minimal pair analysis has revealed 12 monophthongal and six diphthongal vowel phonemes, namely, /iː/ /ɪ/ /e/ /eː/ /æ/ /ɐː/ /ɐ/ /ɔ/ /oː/ /ʊ/ /ʉː/ /ɜː/ and /æɪ/ /ɑe/ /oɪ/ /æɔ/ /əʉ/ /ɪə/. To this set of phonemes we must also add schwa /ə/, the vowel that occurs in the majority of unstressed syllables in English and is particularly common in Australian English. The minimal pair *patty* [pʰætiː] versus *patter* [pʰætə] illustrates its phonemic status. An alternative way of symbolising these phonemes is given in the MD phonemic system as /i/ /ɪ/ /ɛ/ /ɛə/ /æ/ /a/ /ʌ/ /ɒ/ /ɔ/ /ʊ/ /u/ /ɜ/ /eɪ/ /aɪ/ /ɔɪ/ /aʊ/ /oʊ/ /ɪə/. See **Table 2.1** for details. Phonemic vowel sets may differ slightly in different varieties of English because the symbols are chosen as a shorthand way of representing the phonemes, which may vary between the different varieties. Importantly, in English, each of the vowel phonemes has a number of variants (allophones). The choice of allophone is not random or haphazard – it is principled.

minimal pair
Two (or more) separate words that are identical except for one sound segment that occurs in the same position in each word, e.g. *pan* /pæn/, *ban* /bæn/, *man* /mæn/.

Complementary distribution

As we have seen, minimal pairs illustrate that some speech sounds are contrastive in a language (e.g. the vowels in *bit* and *bet*) and these contrastive sounds represent the set of phonemes of that language. We have also seen that some sounds are not contrastive; they do not contrast meanings and cannot be used to make different words. The rounded and unrounded [s] sounds in *see* and *saw* respectively were cited as examples that do not contrast. The substitution of one for the other does not create a minimal pair, so you can say the word *sat* with either an unrounded [s] or a rounded [sʷ] and the meaning of the word remains the same. The rounded and unrounded allophones of the /s/ phoneme do not occur in the same phonological context, as **Table 3.1** illustrates.

Table 3.1 Distribution of rounded and unrounded /s/ in English

	Before a rounded vowel	Before an unrounded vowel
Rounded [sʷ]	Yes	No
Unrounded [s]	No	Yes

Where rounded [sʷ] occurs, unrounded [s] does not occur and vice versa. In this sense the phones are said to complement each other, or to be in **complementary distribution**. The choice of an allophone is typically determined by its phonetic environment, and this gives rise to complementary distribution. Complementary distribution is a fundamental concept of phonology and can be illustrated with examples from everyday life. Let us consider a couple of examples that draw on the common experience of reading and writing English.

The first example focuses on printed letters, such as those that appear on the pages of this book. Each printed letter of English has two main variants: lower case and upper case (capital letters). If we restrict our attention to words that are not proper names or acronyms (e.g. *Ron* or *UNICEF*), we can formulate a simple rule that does a fair job of determining how letters will be printed: a letter is printed in upper case if it is the first letter of a sentence; otherwise, it is printed in lower case.

complementary distribution
The situation in which phones do not occur in the same phonetic environment, e.g. [s] and [sʷ] in English words like *see* and *saw*, respectively.

Even ignoring names and acronyms, this rule is only approximately right; but let's go with it anyway. It helps to explain why written sentences such as the following appear so strange:

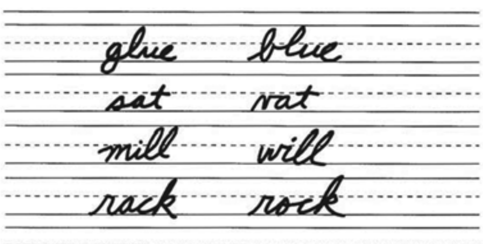
phonology is the study of the sound patterns of human languageS.

pHONOLOGY iS tHE sTUDY oF tHE sOUND pATTERNS oF hUMAN lANGUAGES.

To the extent that the rule is correct, the lower-case and upper-case variants of an English letter are in complementary distribution. The upper-case variant occurs in one particular environment (i.e. at the beginning of the sentence) and the lower-case variant occurs elsewhere (i.e. in every other environment). Therefore, just as every English vowel phoneme has an oral and a nasalised allophone that occur in different spoken environments (as described in Chapter 2), every letter of the English alphabet has two variants, or **allographs**, that occur in different written environments. In both cases, the two variants of a single abstract representation (e.g. phoneme or letter) are in complementary distribution because they never appear in the same environment. And substituting one for the other – a rounded/s/ in place of an unrounded one, or an upper-case letter in place of a lower-case one – may sound or look unusual, but it will not change the meaning of what is spoken or written.

allograph
One of the various alternative forms of an alphabetic letter, for example, the capital, lower-case, italicised or handwritten versions of the letter *A*.

Our second example turns to cursive handwriting, which you are likely to have learnt in primary school. Writing in cursive is in one sense more similar to the act of speaking than printing is, because in cursive writing each letter of a word (usually) connects to the following letter – just as nearby sounds influence one another during speech. Of course, in speech there is a lot more overlap than there is in producing cursive handwriting, but this example is simply used to illustrate the concept of variation. The following figure shows that the connections between the letters of a word in cursive writing create different variants of a letter in different environments:



Compare how the letter *l* appears after a *g* (as in *glue*) and after a *b* (as in *blue*). In the first case, the *l* begins near the bottom of the line, but in the second case, the *l* begins near the middle of the line (which is indicated by the dashes). In other words, the same letter *l* has two variants. It does not matter where the *l* begins, it is still an *l*. Equally, it does not matter whether an/s/ in English is rounded or not, it is still an s sound. In the cursive writing example, the variant that occurs in a particular word is determined by the immediately preceding letter. The variant that begins near the bottom of the line appears after letters such as *g* that end near the bottom of the line. The variant that begins near the middle of the line appears after letters such as *b* that end near the middle of the line. The two variants of *l* are therefore in complementary distribution.

This pattern of complementary distribution is not specific to *l* and occurs for other cursive letters in English. By examining the pairs *sat* and *vat*, *mill* and *will*, and *rack* and *rock*, you can see the complementary distribution of the variants of the letters *a*, *i* and *c*, respectively. In each case, the immediately preceding letter determines which variant occurs, with the consequence that the variants of a given letter are in complementary distribution.

When sounds are in complementary distribution, they do not contrast with each other. The replacement of one sound for the other will not change the meaning of the word, although it might not sound like typical English pronunciation. Given these facts about the patterning of sounds in a language, a phoneme is the common abstract representation of a set of phonetically similar sounds that pattern in complementary distribution. These sets of sounds may consist of a small or a large number of members. It is important to acknowledge that speech is highly variable; variation occurs between allophones as we have seen, but even within allophones there are infinitely variable ways that phones can be produced. It is the patterning of this variation that is the key to understanding phonology.

Complementary distribution alone is insufficient for determining the allophones of a phoneme. The phones must be phonetically similar; that is, they must share phonetic features. In English, the velar nasal [ŋ] and the glottal fricative [h] are in complementary distribution – [ŋ] does not occur word initially and [h] does not occur word finally – but they share very few phonetic features. [ŋ] is a voiced velar nasal stop, and [h] is a voiceless glottal fricative. Therefore, they cannot be allophones of the same phoneme; [ŋ] and [h] are allophones of different phonemes.

Let us now revisit the distinction between a phoneme and its allophones. We use slant brackets / / to enclose phonemes and square brackets [ ] for allophones or phones. For example, [tʰ] and [t] in *tick* and *stick* are allophones of the phoneme /t/. Therefore we represent *tick* and *stick* phonemically as /tɪk/ and /stɪk/ and refer to these as broad transcriptions of the two words. In broad transcription only the phonemes are represented and not any of the detail associated with allophones. Speakers of a language generally perceive the different allophones of a single phoneme as the same sound. Most speakers of English are, for example, unaware that the /t/ sounds in *tick* and *stick* are actually different. This is because speakers are usually only consciously aware of phonemes and not the variation associated with allophones. These two words would be represented with more allophonic detail in a narrow phonetic transcription as [tʰɪk] and [stɪk].

Phonemes are the dark matter of phonology; they are not physical sounds and are therefore not directly observable. They are abstract representations of the phonological units of a language – the units used to represent words in our mental lexicon – and therefore the underlying forms of words. We have now described two different levels of representation: the underlying representation (phonemic) and the surface representation (phonetic). Let us consider a few more examples from English to illustrate these concepts.

An illustration of vowel allophones: nasalisation in English

In English we can identify a phonological process whereby vowels are nasalised under certain conditions. In Chapter 2 we noted that both oral and nasalised vowels occur phonetically in English. The following examples are used as an illustration:

bin	[bɪ̃n]	bid	[bɪd]
rang	[ɹæ̃ŋ]	rag	[ɹæg]

The symbol for nasalisation is the tilde [˜]. Taking oral vowels as basic, we can propose a phonological rule to describe this process that states: vowels become nasalised before a nasal consonant (within the same syllable).

This rule expresses our unconscious phonological knowledge of English pronunciation: nasalised vowels occur before nasal consonants but not elsewhere. The effect of this rule is exemplified in **Table 3.2**.

Table 3.2 **Nasalised and oral vowels: English words and non-words**

Words						Non-words		
bee	[bi:]	bead	[bi:d]	bean	[bĩ:n]	*[bĩ:]	*[bĩ:d]	*[bi:n]
bar	[bɐ:]	bard	[bɐ:d]	barn	[bɐ̃:n]	*[bɐ̃:]	*[bɐ̃:d]	*[bɐ:n]
core	[k^{h}o:]	cord	[k^{h}o:d]	corn	[k^{h}õ:n]	*[k^{h}õ:]	*[k^{h}õ:d]	*[k^{h}o:n]

As the examples in Table 3.2 illustrate, oral vowels in English occur in final position and before non-nasal consonants; nasalised vowels occur only before nasal consonants. The non-words (indicated with an asterisk *) show us that nasalised vowels do not occur word finally or before non-nasal consonants, and nor do oral vowels occur before nasal consonants.

Speakers may not be aware of this variation in their vowel production. Whether they speak or hear the vowel in *bin* with or without nasalisation does not matter. Without nasalisation it might sound like non-native English, but *bin* produced as [bĩn] and *bin* produced as [bɪn] conveys the same word. Similarly, if *bid* was produced with a nasalised vowel as [bĩd], it might sound nasal but the word would remain *bid*. Because nasalisation is a non-contrastive difference insofar as it does not change the word, we tend to be unaware of it.

Compare this situation with a change in vowel height. If you intend to say *bid* but say *bad* instead, that makes a real difference to meaning. The [ɪ] in *bid* and the [æ] in *bad* are sounds from different phonemes. Substituting one for the other results in a totally different word. In contrast, the [ɪ] in *bid* and the [ĩ] in nasalised *bid* are not separate phonemes and therefore do not lead to a difference in meaning. These two sounds [ɪ] and [ĩ] belong to the same phoneme, a high front vowel that we denote as /ɪ/.

phonological processes
Processes that apply to underlying representations to derive phonetic representations (pronunciation).

Phonological processes of the language apply to the underlying forms of words to determine the phonetic output (speech production), such as the nasalisation process and its rule that we have just described.

An illustration of consonant allophones: variation in English /t/

Consonants, too, have allophones whose distribution is predictable. For /t/ the following examples illustrate the point:

tick [t^{h}ɪk]	stick [stɪk]	hit [hɪt]	bitter [bɪɾə]	butler [bɐʔlə]

In *tick* we expect to find an aspirated [t^{h}], whereas in *stick* and *hit* we find an unaspirated [t]; in *bitter* we often find the tap [ɾ]; and a glottal stop [ʔ] is common in *butler*. See Chapter 2 for details of these speech sounds. Note that this is not the full set of /t/ variants in English.

We account for the variation in how *t* is produced by positing a phoneme /t/ in the underlying representation with a number of different allophones [t^{h}], [t], [ɾ] and [ʔ]. We may also posit phonological rules, which roughly state that within words the aspirated [t^{h}] occurs before a stressed vowel and the unaspirated [t] occurs after /s/ at the beginning of a syllable or at the end of a word. In many cases the tap [ɾ] occurs between a stressed vowel and an unstressed vowel, and the glottal stop [ʔ] occurs before a consonant that begins a new syllable. Note that some of these rules vary across speakers and speaking contexts.

Whether we pronounce *hit* as [hɪt], [hɪt^{h}], [hɪɾ] or [hɪʔ], the meaning of the word itself does not change. The allophones of a phoneme *do not contrast*. On the other hand, for *hit*, if we change the voicing and say *hid*, or the manner of articulation and say *hiss*, or *hill*, or change the place and nasality and say *him*, the meaning of the word does change. These sounds *do* contrast. *Hit*, *hid*, *hiss*, *hill* and *him* therefore form a minimal set that shows us that there are phonemes /t/, /d/, /s/, /l/ and /m/ in English. We may proceed in this manner to discover other phonemes by considering *pick, kick, Mick, Vic, thick, chick* and *Rick* to infer the phonemes /p/, /k/, /m/, /v/, /θ/, /ʧ/, /ɹ/. By finding other minimal pairs and sets, we would discover yet more consonant phonemes, such as /ð/, which, together with /θ/, contrasts the words *thy* and *thigh*, or *either* and *ether*.

Each of these phonemes has its own set of allophones, and a specific set of phonological rules that describe in which context allophones are produced. It should be clear at this point that speech production is not a random process. It is systematic and rule-governed and, while the systems and the processes may appear complex, they are no more than a compendium of the knowledge that every speaker has.

Phonological features

Even though we are aware of the phonemes, we are not usually aware of the phonetic properties or features that distinguish the phonemes of our language. Phonetics provides the means for describing the phones (sounds) of language, showing how they are produced and how they vary. Phonology helps us understand how humans categorise sound, how sounds are represented in the mind, how various sounds form patterns, and how the phonemes and their allophones work in language.

For two phones to create contrasts between words, there must be some phonetic difference between them. The minimal pair *sit* [sɪt] and *zit* [zɪt] shows that [s] and [z] represent two contrasting phonemes in English. They cannot be allophones of one phoneme because we cannot replace the [s] with the [z] without changing the meaning of the word. Furthermore, they are not in complementary distribution; both occur word initially before the vowel [ɪ]. They are therefore allophones of the two different phonemes /s/ and /z/. From the discussion of phonetics in Chapter 2, we know that [s] and [z] differ in voicing: [s] is voiceless and [z] is voiced. The phonetic feature of voicing therefore distinguishes the two words. Voicing also distinguishes *feel* and *veal* [f]/[v] and *cap* and *cab* [p]/[b]. It is clear then that segments can be categorised into groups. In the example above, we have a group of consonants that is voiceless and a group that is voiced. In Chapter 2 we discussed consonants and vowels separately because they can be classified as two separate groups of sounds with different properties. We further classified sounds according to their place and manner of articulation among other aspects. The classification of segments is possible because each segment is decomposable into a set of features that defines it. These **phonological features**[3] are elements that can be used to define natural classes; that is, those segments that behave in similar ways in phonology.

phonological feature
Phonetic property of a speech sound that defines the categories to which the sound belongs, e.g. *voice*, *continuant*.

Contrastive and non-contrastive features

One can think of voicing and voicelessness as the presence or absence of a single feature, [voice]. This single feature may have two values: plus (+), which signifies its presence, and minus (–), which signifies its absence. For example, [b] is [+voice] and [p] is [–voice].

The presence or absence of nasality can similarly be designated as [+nasal] or [–nasal], with [m] being [+nasal] and [b] and [p] being [–nasal]. A [–nasal] sound is an oral sound.

Phones and phonemes are not indissoluble units; they are composed of features. We consider the phonetic and phonemic symbols to be *cover symbols* for sets of features. The symbol is a shorthand method of specifying the phonetic properties of the segment. A more explicit description of the phonemes /p/, /b/ and /m/ may thus be given in a **feature matrix**, as shown in Table 3.3. Note that in this matrix the stop manner of articulation is represented by the feature [–continuant], which we will discuss later in the chapter.

feature matrix
A representation of phonological segments in which the columns represent segments and the rows represent features, each cell being marked with a + or – to designate the value of the feature for that segment.

Table 3.3 **Feature matrix for /p/, /b/ and /m/**

	p	b	m
continuant	–	–	–
labial	+	+	+
voice	–	+	+
nasal	–	–	+

A feature is contrastive when the + value of that feature in certain words contrasts with the – value of that feature in other words. At least one feature value difference must distinguish each phoneme from all the other phonemes in a language. Because the phonemes /b/, /d/ and /g/ contrast by virtue of their place of articulation features – labial, alveolar and velar – these place features are also contrastive in English. The distinctive features of the voiced stops in English are shown in **Table 3.4**. Note that in this matrix the alveolar place of articulation is represented by the feature [coronal] and the velar place of articulation is represented by the feature [dorsal], which we will also discuss later in the chapter.

Table 3.4 **Feature matrix for /b/, /m/, /d/, /n/, /g/ and /ŋ/**

	b	m	d	n	g	ŋ
continuant	–	–	–	–	–	–
voice	+	+	+	+	+	+
labial	+	+	–	–	–	–
coronal	–	–	+	+	–	–
dorsal	–	–	–	–	+	+
nasal	–	+	–	+	–	+

Each phoneme in this chart differs from all the other phonemes by at least one feature. Vowels, too, can be described with reference to phonological features. The feature [back], for example, is one of the features that distinguishes the vowel in *look* [lʊk] ([+back]) from the vowel in *lick* [lɪk] ([–back]). The feature [back] is therefore contrastive.

predictable (non-contrastive) feature

A non-contrastive feature of a phone that is predictable by rule, e.g. aspiration in English voiceless stops or nasalisation in English vowels.

We have seen that nasality is a contrastive feature of English consonants, but it is a **predictable (non-contrastive) feature** for English vowels. Predictable means that it is predictable by rule. Given the arbitrary relationship between form and meaning, there is no way to predict that the word *meek* begins with a nasal bilabial stop [m] and that the word *beak* begins with an oral bilabial stop [b]. When you learn words, you have to learn which individual phonemes make up the word. On the other hand, the nasality feature value of the vowels in *bean*, *mean*, *comb* and *sing* is predictable because these vowels occur before nasals. When a feature value is predictable for a certain class of sounds, the feature is a non-contrastive (predictable) feature for that class. Therefore, nasality is a non-contrastive (predictable) feature in English vowels, but a contrastive (phonemic) feature for English consonants.

This is not the case in all languages. As mentioned above, nasality of vowels is contrastive in Portuguese. In French, nasality is a contrastive feature for both vowels and consonants: *gars* (lad), pronounced [ga], contrasts with *gant* (glove) [gã]; and *bal* (dance) [bal], contrasts with *mal* (evil) [mal]. Therefore, French has both oral and nasal consonant and vowel phonemes; English has oral and nasal consonant phonemes, but only oral vowel phonemes.

Like French, the African language Akan, spoken in Ghana, has nasal vowel phonemes as the following examples illustrate:

[ka]	bite	[kã]	speak
[fi]	come from	[fĩ]	dirty
[tu]	pull	[tũ]	den
[nsa]	hand	[nsã]	liquor
[ʧi]	hate	[ʧĩ]	squeeze
[pam]	sew	[pãm]	confederate

Nasalisation is not predictable for vowels in Akan as it is in English, as shown by the minimal pair [pam] and [pãm]. If you substitute an oral vowel for a nasal vowel or vice versa, you will change the word in this language.

Two languages may have the same phonetic segments (phones) but have two different phonemic systems. Phonetically, both oral and nasalised vowels exist in English, Akan, Portuguese and French; however, English does not have nasalised vowel phonemes but Akan, Portuguese and French do. The same phonetic segments function differently in these languages. Nasalisation of vowels in English is non-contrastive; nasalisation of vowels in Akan, Portuguese and French is contrastive.

Another non-contrastive feature in English is aspiration. Previously we have shown that in English both aspirated and unaspirated voiceless stops occur, but these are not contrastive. The voiceless aspirated stops, [p^{h}], [t^{h}], [k^{h}], and the voiceless unaspirated stops, [p], [t], [k], are in complementary distribution in English, as shown in **Table 3.5**.

Table 3.5 Aspirated and unaspirated voiceless stops: English words and non-words

Syllable initial before a stressed vowel			After a syllable initial /s/			Phonologically Ill-formed*		
[p^{h}]	[t^{h}]	[k^{h}]	[p]	[t]	[k]			
pill	till	kill	spill	still	skill	*[pɪɫ]	*[tɪɫ]	*[kɪɫ]
[p^{h}ɪɫ][4]	[t^{h}ɪɫ]	[k^{h}ɪɫ]	[spɪɫ]	[stɪɫ]	[skɪɫ]	*[sp^{h}ɪɫ]	*[st^{h}ɪɫ]	*[sk^{h}ɪɫ]
par	tar	car	spar	star	scar	*[pɐː]	*[tɐː]	*[kɐː]
[p^{h}ɐː]	[t^{h}ɐː]	[k^{h}ɐː]	[spɐː]	[stɐː]	[skɐː]	*[sp^{h}ɐː]	*[st^{h}ɐː]	*[sk^{h}ɐː]

Where the unaspirated stops occur, the aspirated ones do not and vice versa. You could say *spit*, if you wanted to, with an aspirated [p^{h}], as [sp^{h}ɪt], and it would be understood as 'spit', but listeners would probably think you were spitting out your words. Given this distribution, we see that aspiration is a non-contrastive feature in English; aspiration is a predictable feature of voiceless stops when they occur in initial position in a stressed syllable.

This is the reason speakers of English usually identify the [p^{h}] in *pill* and the [p] in *spill* as the same sound, just as they consider the [ɪ] and [ɪ̃] that represent the phoneme /ɪ/ in *bid* and *bin* to be the same. They do so because the difference between them is predictable, non-contrastive and non-phonemic. This example illustrates why we refer to the phoneme as an abstract unit. We do not utter phonemes; instead, we produce phones. In English /p/ is a phoneme that is realised phonetically (pronounced) as both [p] and [p^{h}], depending on context. The phones [p] and [p^{h}] are allophones of the phoneme /p/. That *pit/pat* and *spit/spat* are phonemically transcribed with an identical /p/ reveals the fact that English speakers consider the [p^{h}] in *pit* [p^{h}ɪt] and the [p] in *spit* [spɪt] to be phonetic manifestations of the same phoneme /p/. This is also reflected in spelling, which is more attuned to phonemes than to individual phones.

Aspiration of voiceless stops further illustrates the differences between the phonological systems of different languages. Both aspirated and unaspirated voiceless stops occur in English and Thai but they function differently in the two languages. Aspiration in English is a non-contrastive feature because its presence or absence is predictable. In Thai it is not predictable, as the following examples (modified for simplicity) show:

Voiceless unaspirated		Voiceless aspirated	
[paa]	forest	[p^haa]	to split
[tam]	to pound	[t^ham]	to do
[kat]	to bite	[k^hat]	to interrupt

The voiceless unaspirated and the voiceless aspirated stops in Thai are not in complementary distribution. They occur in the same positions in the minimal pairs; they contrast and therefore represent separate phonemes. In both English and Thai, the phones [p], [t], [k], [p^h], [t^h] and [k^h] occur. In English, these six sounds realise three phonemes /p/, /t/ and /k/; in Thai, they realise six phonemes /p/, /t/, /k/, /p^h/, /t^h/ and /k^h/.

phonetic representation
The surface representation of words and sentences; symbolic transcription of the pronunciation of words and sentences.

phonemic representation
The abstract (underlying) phonological representation of words and sentences.

The phonetic representation of utterances indicates some of the detail of how speakers pronounce the sounds in words: the surface representation

The phonemic representation of utterances is a further abstraction from actual production and contains implicit information about what speakers 'know' about the patterning of sounds: the underlying representation

In Auslan phonology, signs can be broken down into smaller features that are in many ways analogous to the phonemes and features in spoken languages. Like sounds, signs can be decomposed into smaller minimal units (i.e. handshape, orientation, location and movement) that contrast meaning, as discussed in Chapter 2. There are minimal pairs that are distinguished by a change in one or another of the defining features. For example, the Auslan signs meaning *praise* and *criticise* are articulated at the same location in front of the chest and involve the same circular movement, but contrast minimally in hand configuration. *Sister* and *dinner* are a minimal set contrasting only in place of articulation (location), and *brother* and *paper* contrast only in movement. Some features are non-contrastive. Whether a sign is articulated on the right or left hand usually does not affect its meaning. Signs may also occur with non-manual features (i.e. that do not make use of the hands) such as head movement, facial expressions, eye gaze direction, and mouth actions, or combinations of these. Non-manual features are sometimes used to express emotion and add emphasis or additional meaning, just as prosody does in spoken language (see the section on 'Prosodic phonology' later in this chapter).

Natural classes of speech sounds

> It's as large as life, and twice as natural!
>
> Lewis Carroll, *Through the Looking-Glass*, 1871

Linguists classify speech sounds in a way that is similar to a biologist classifying the diversity of life. Just as the biologist distinguishes between animals and plants; and, within animals, between vertebrates and invertebrates; and within vertebrates, between mammals and reptiles, the linguist classifies sounds as either consonants or vowels. Within consonants, sounds are voiced or voiceless and so on. All the classes of sounds described in Chapter 2 combine to form larger, more general phonological categories that are important in the patterning of sounds in the world's languages. Here we will discuss the major class features with reference to English consonants and vowels.

Obstruents and sonorants

Oral stops, fricatives and affricates form a major class of sounds called **obstruents**. The airstream may be fully obstructed, as in oral stops and affricates, or partially obstructed, as in the production of fricatives. Fricatives are continuant obstruents. For the fricatives (/f/, /v/, /θ/, /ð/, /s/, /z/, /ʃ/, /ʒ/, /h/), the air flows continuously out of the mouth, although it is obstructed enough to cause the frictional sound that characterises fricatives.

Oral stops (/p/, /b/, /t/, /d/, /k/, /g/) and affricates (/ʧ/, /ʤ/) are non-continuant obstruents; there is a complete blockage of the air during the production of these sounds. The closure of a stop is released abruptly, as opposed to the closure of an affricate, which is released gradually, causing friction. This difference is captured by the feature [±delayed release].

Sounds that are not obstruents are **sonorants**. Vowels, nasals (/m/, /n/, /ŋ/) and approximants (liquids /l/ and /ɹ/, and glides /j/ and /w/) are sonorants. They are produced with relatively free airflow through either the mouth or nose. They have greater acoustic energy than obstruents. Nasals are sonorants because, although the air is blocked in the mouth, it continues into the nasal cavity, causing resonance. Vowels and approximants are also sonorants because they are resonant sounds created as the air flows relatively unobstructed through the vocal tract. Sonorants are designated the feature [+sonorant]. Obstruents are designated the feature [–sonorant].

Syllabic (vocalic) sounds

The feature **syllabic**[5] is reserved for those sounds that function as the core (nucleus) of a syllable (i.e. vowels – the vocalic component). Clearly vowels are [+syllabic], but these are not the only sound classes around which syllables can form. The approximant /l/ and nasals can also be syllabic,[6] as shown by the words *dazzle* [dæzɫ̩],[7] *rhythm* [ɹɪðm̩] and *kitten* [kʰɪtn̩]. The diacritic mark under the phones [l], [m] and [n] is the phonetic notation used for syllabic consonants. In English, syllabic consonants may occur as the phonetic realisation of an unstressed syllable containing schwa /ə/. These three words could be transcribed phonemically as /dæzəl/, /ɹɪðəm/ and /kɪtən/.

Australian English vowels can be described with reference to the features [high], [low], [back], [round], and [long]. In other varieties of English [tense] is often used instead of [long].

Obstruents and semivowels (**glides**) /w/ and /j/ are not syllabic sounds because they are always accompanied by a vowel, and that vowel functions as the syllabic nucleus.

Consonantal

The sounds of all languages can be classified as either consonants or vowels. Speech sounds vary along a scale according to how **consonantal** or vowel-like they are. Some consonants are more consonantal than others. Obstruents are the most consonantal and the least vowel-like. Nasals and the approximants /l/ and /ɹ/ are less consonantal and more vowel-like because they are resonant sounds like vowels. /l/ and /ɹ/ form a class of sounds called **liquids**. The semivowel approximants, the glides /w/ and /j/, are the least consonantal and the most vowel-like. In recognition of this sliding scale, linguists say that obstruents, liquids and nasals all belong to a subclass of consonants called 'consonantal' [+consonantal], whereas semivowels and vowels are excluded from this class and are [–consonantal].

Here are some other terms used to form subclasses of English consonantal sounds. These are not exhaustive, and a full course in phonology would note further classes that we omit.

obstruent
A sound from the class of sounds consisting of oral **stops**, **fricatives** and **affricates**; non-sonorants.

sonorant
A sound belonging to the class that includes vowels, approximants and nasals; non-obstruents.

syllabic
A phonetic feature of those sounds that may constitute the **nucleus** of **syllables**; all vowels are syllabic. In English, liquids and nasals may be phonetically but not phonemically syllabic in such words as *bottle*, *button*, *bottom*.

glide
An approximant consonant, such as /w/ or /j/; also referred to as **semivowels** due to their vowel-like articulatory and acoustic properties.

consonantal
A phonetic feature distinguishing the class of **obstruents**, **liquids** and **nasals**, which are [+consonantal], from other sounds (**vowels** and **semivowels**), which are [–consonantal].

liquid
A sound such as /l/ or /ɹ/ that has vowel-like acoustic properties and may function phonetically as a syllabic **nucleus** in many varieties of English.

labial
A sound articulated with the lips, e.g. /b/, /f/, /m/.

coronal
A sound articulated by raising the tip or blade of the tongue, including **alveolars** and **postalveolars**, e.g. /t/, /ʃ/.

anterior
A phonetic feature of consonants whose place of articulation is in front of the palatoalveolar area, including **labials**, **interdentals** and **alveolars**.

dorsal
A sound articulated by raising the back of the tongue towards the **velum**, e.g. /k/, /g/, /ŋ/.

sibilant
A sound characterised acoustically by an abundance of high-intensity and high-frequencies perceived as 'hissing', e.g. /s/.

natural class
A class of sounds characterised by a phonetic property or feature that pertains to all members of the set, e.g. the class of stops. A natural class may be defined with a smaller feature set than that of any individual member of the class.

Labial /p/ /b/ /m/ /f/ /v/ /w/

The class of **labial** consonants includes the bilabial sounds /p/ /b/ /m/, the labiodentals /f/ and /v/, and the labiovelar /w/. Labial sounds are those articulated with the involvement of the lips.

Coronal /θ/ /ð/ /t/ /d/ /n/ /s/ /z/ /ʃ/ /ʒ/ /ʧ/ /ʤ/ /l/ /ɹ/ /j/

Coronals are those consonants that use the tip or blade of the tongue. They include the dentals /θ/ and /ð/, the alveolars /t/ /d/ /n/ /s/ /z/ /l/, and the postalveolars /ʧ/ /ʤ/ /ʃ/ /ʒ/ /ɹ/. The palatal /j/ is also considered coronal in many feature systems. In some systems the feature [±anterior] is used to distinguish place of articulation within the coronal class, with [+anterior] reserved for consonants created at either the alveolar or **anterior** to alveolar places of articulation.

Dorsal /k/ /g/ /ŋ/

Dorsals are produced with the back of the tongue by raising it towards the velum, and include /k/ /g/ /ŋ/.

Sibilants /s/ /z/ /ʃ/ /ʒ/ /ʧ/ /ʤ/

Another class of consonantal sounds is characterised by an acoustic rather than an articulatory property of its members. The friction created in the production of some fricatives and affricates causes a high-frequency and high-intensity sound. These sounds form the class of **sibilants**. Compare the intensity of the noise produced when you make /s/ compared with the noise for /f/. /s/ is a sibilant and /f/ is a non-sibilant.

Non-continuants and continuants

Stops and affricates are non-continuants. There is a total obstruction of the airstream in the oral cavity. Nasals are included as non-continuants although air flows continuously out of the nose. All other consonants, and all vowels, are continuants, in which the stream of air flows continuously out of the mouth.

Natural classes

The more linguists examine the phonologies of the world's languages, the more they find similar phonological processes involving similar classes of sounds. For instance, in many languages besides English, vowels are nasalised before nasal consonants, described by the rule:

Nasalise a vowel when it precedes a nasal consonant in the same syllable.

For these languages the nasalisation process will apply to all vowel phonemes when they occur in a context preceding any [+nasal] segment in the same syllable, and will add the feature [+nasal] to the feature matrix of the vowel. Our description of vowel nasalisation in English needs only specify the process and the rule that describes it. It need not include a list of the individual vowels that are affected or a list of the sounds that result from its application.

Many languages have phonological processes that refer to [+voice] and [–voice] sounds. For example, aspiration in English applies to the class of [–voice] non-continuant sounds in initial position of stressed syllables. As in vowel nasality, we do not need to consider individual segments. The process automatically applies to initial /p/, /t/ and /k/. Phonological processes typically apply to **natural classes** of sounds. A natural class is a group of sounds defined by a small number of features, such as [–voice], [–continuant], which describe /p/, /t/ and /k/. Any individual member of a natural class requires more features in its description than the class itself, so /p/ is not only [–voice], [–continuant] but also [+labial].

The relationships among the phonological processes and natural classes illustrate why segments can be regarded as bundles of features. If segments were not specified as feature matrices, the similarities among /p/, /t/, /k/ or /m/, /n/, /ŋ/ would be lost. It would be just as likely for a language to have a process described by a rule such as:

Rule 1: nasalise vowels before /p/, /ɪ/ or /z/

as to have a rule such as:

Rule 2: nasalise vowels before /m/, /n/ or /ŋ/.

Rule 1 has no phonetic explanation, whereas rule 2 does: the lowering of the velum in anticipation of a following nasal consonant causes the vowel to be nasalised. In rule 1, the environment is a motley collection of unrelated sounds that cannot be described with a small set of features. Rule 2 applies to the natural class of nasal consonants, namely, sounds that are [+nasal][+consonantal].

The various classes of sounds discussed above also define natural classes to which the phonological rules of all languages may refer. They can also be specified by + and – feature values. Table 3.6 illustrates how these feature values combine to define some major classes of phonemes.

Table 3.6 Feature specification of major natural classes of sounds

Features	Obstruents	Nasals	Liquids	Semivowels	Vowels
Consonantal	+	+	+	–	–
Sonorant	–	+	+	+	+
Syllabic	–	–	–	–	+
Nasal	–	+	–	–	–

Feature specifications for Australian English consonant and vowel phonemes

Using the phonetic properties provided in Chapter 2 and the additional features in this chapter, we can provide feature matrices for all the phonemes in English using the + or – value. We can then easily identify the members of each class of phonemes by selecting all the segments marked + or – for a single feature. Therefore, the high vowels /iː/ /ɪ/ /ʉː/ /oː/ /ʊ/ /i/ /ɪ/ /u/ /ɔ/ /ʊ/ are marked [+high] in the following vowel feature chart (Table 3.7) and the class of stops and affricates /p/ /b/ /m/ /t/ /d/ /n/ /k/ /g/ /ŋ/ /ʧ/ /ʤ/ are those phonemes marked [–continuant] in the consonant chart (Table 3.8). Note that in this table we use the feature [front] after Hayes (2009) because Australian English contains central vowels that must be defined as [–front, –back].

Table 3.7 Specification of phonemic features of some Australian English vowels

HCE and MD symbols	iː	ɪ	e	eː	æ	ɜː	ə	ɐ	ɐː	ɔ	oː	ʊ	ʉː
	i	ɪ	ɛ	ɛə	æ	ɜ	ə	ʌ	a	ɒ	ɔ	ʊ	u
High	+	+	–	–	–	–	–	–	–	–	+	+	+
Low	–	–	–	–	+	–	–	+	+	–	–	–	–
Front	+	+	+	+	+	–	–	–	–	–	–	–	–
Back	–	–	–	–	–	–	–	–	–	+	+	+	–
Round	–	–	–	–	–	–	–	–	–	+	+	+	+
Long	+	–	–	+	–	+	–	–	+	–	+	–	+

Table 3.8 **Phonemic features of Australian English consonants**

Features	p	b	m	t	d	n	k	g	ŋ	f	v	θ	ð	s	z	ʃ	ʒ	h	ʧ	ʤ	l	ɹ	j	w
Consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	–	–
Sonorant	–	–	+	–	–	+	–	–	+	–	–	–	–	–	–	–	–	–	–	–	+	+	+	+
Syllabic	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nasal	–	–	+	–	–	+	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Voice	–	+	+	–	+	+	–	+	+	–	+	–	+	–	+	–	+	–	–	+	+	+	+	+
Continuant	–	–	–	–	–	–	–	–	–	+	+	+	+	+	+	+	+	+	–	–	+	+	+	+
Labial	+	+	+	–	–	–	–	–	–	+	+	–	–	–	–	–	–	–	–	–	–	–	–	+
Palatal	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	–
Anterior	+	+	+	+	+	+	–	–	–	+	+	+	+	+	+	–	–	–	–	–	+	–	–	–
Dorsal	–	–	–	–	–	–	+	+	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+
Coronal	–	–	–	+	+	+	–	–	–	–	–	–	–	+	+	+	+	–	+	+	+	+	+	–
Sibilant	–	–	–	–	–	–	–	–	–	–	–	–	–	+	+	+	+	–	+	+	–	–	–	–

Note: The [+voice] feature value is redundant for English nasals, liquids and glides and could have been left blank for this reason. The redundant predictable feature specifications are provided simply to illustrate the segments in these natural classes. In some systems [±anterior] is only used to distinguish between coronals. /l/ is the only [+lateral] phoneme, which differentiates it from /ɹ/ along with place. Note that [lateral] is not included in the matrix here.

Phonological rules

Throughout this chapter we have emphasised that the relationship between the *phonemic* (underlying) representations of words and the *phonetic* (surface) representations that reflect the production of these words is *rule-governed*. Phonological rules can be used to describe the processes that relate the phonemic representations to the phonetic representations.

redundant
Describes a non-contrastive, non-phonemic feature that is predictable from other feature values of the segment, e.g. [+voice] is redundant for any [+nasal] **phoneme** in English since all nasals are phonemically voiced in this language.

The phonemic representations are *minimally specified* because some features or feature values are predictable. In English, for example, all nasals are voiced, so we do not need to specify voicing in the phonemic feature matrix for nasals. Voicing for nasals in English is **redundant**. Similarly, we do not need to specify the *round* feature for back vowels of English. If **Table 3.8** were strictly phonemic, then instead of a + in the *voice* row for /m/, /n/ and /ŋ/, the cells would be left blank, as would the cells in the *round* row of **Table 3.7** for /ʉː/ /u/, /ʊ/, and /oː/ /ɔ/. Such underspecification reflects the redundancy in the phonology, which is also part of a speaker's knowledge of the sound system.

The phonemic representation, then, should include only the non-predictable, contrastive features of the phonemes in a word. The phonetic representation, derived by applying the phonological rules, includes the phonetic aspects of the sounds. It does not include *all* of the physical properties of the sounds of an utterance, however, because the physical signal may vary in many ways that do not relate to the phonological system. The absolute pitch of the speaker's individual voice and the rate and loudness of speech are not generally important in signalling phonemic contrast. Children have higher-pitched voices than adults. One person may speak slowly, have a very soft voice or have a cold. These features are not part of the phonological system at all but are simply characteristic of an individual or situation. This means that the narrow phonetic transcription (which includes a great deal more detail than the broad phonemic transcription) is also an abstraction from the physical signal. It includes only the phonetic aspects of the utterances, those features that remain relatively constant from speaker to speaker and from one time to another, and excludes speaker-specific non-linguistic characteristics.

Although the specific processes of phonology differ from language to language, the type and effect on the natural classes they refer to are the same throughout the world.

Feature change

Some phonological processes may be thought of as **feature-changing** whereby feature values of segments that are already present are changed, either to make them more similar (i.e. assimilation) or less similar (i.e. dissimilation).

feature-changing processes
Change in the feature values of segments, either to make them more similar (see **assimilation**) or less similar (see **dissimilation**).

Assimilation

Nasalisation of vowels in English is an example where the feature of a vowel is changed by the spreading of a phonetic property from neighbouring segments – in this case the nasal feature of the consonant spreads leftward to affect the previous vowel. English vowel nasalisation is an **assimilation process**. The vowel becomes more similar to its nasal neighbour. Phonemically, vowels are not marked for nasality; however, in the environment specified by the nasalisation rule the feature [+nasal] is added.

assimilation process
A phonological process that changes feature values of segments to make them more similar, e.g. a vowel becomes [+nasal] when followed by a [+nasal] consonant; also called feature-spreading.

For the most part, assimilation stems from articulatory processes. There is a tendency when we speak to increase the **ease of articulation**; that is, to articulate efficiently. It is more efficient to lower the velum while a vowel is being produced before a nasal stop than to wait for the completion of the vowel and then force the velum to move down suddenly. This is an example of gestural overlap. The lingual (tongue) gesture associated with the vowel overlaps considerably with the velic gesture associated with the lowering of the velum. When a language has a vowel nasality contrast – as in Portuguese, French and Akan – such articulatory overlap may be suppressed to ensure the maintenance of contrast between nasal and oral vowels. Articulatory phonology[8] is a linguistic theory that makes explicit the relationship between the various speech gestures and proposes that the relative timing and magnitude of the various gestures determines the characteristics of the phonetic output.

ease of articulation
The tendency for speakers to use efficient articulatory strategies. **Phonological processes** are often the result of ease of articulation, e.g. the rule of English that nasalises vowels when they precede a nasal consonant.

We will now look more closely at the phonological processes and their descriptive rules we have been discussing. Previously, we stated the English vowel nasalisation rule as: *Vowels become nasalised before a nasal consonant (within the same syllable).*

This rule:

- specifies the class of sounds affected: *vowels*
- states what phonetic change will occur by application of the rule: *change phonemic oral vowels to phonetic nasal vowels*
- specifies the context or phonological environment: *before nasal consonants within the same syllable*.

A shorthand notation can be used to represent rules, similar to the way scientists and mathematicians use symbols. Every physicist knows that $E = mc^2$ means 'Energy equals mass times the square of the velocity of light'. Children know that 2 + 6 = 8 can be stated in words as 'two plus six equals eight'. We can use similar notations to represent vowel nasalisation:

V → [+nasal] / __ [+nasal] $

Let's look at the structure of the equation piece by piece.

V	→	[+nasal]	/	__	[+nasal]	$
Vowels	become	nasalised	in the environment	before	nasal segments	before a syllable boundary

To the left of the arrow is the *class of sounds* affected. In this case it is a *V* for vowel. To the right of the arrow is the *phonetic change* that occurs. *The phonological environment* follows the slash. The underscore (_) is the relative position of the sound to be changed within the environment; in this case, *before* a nasal segment. The dollar sign indicates a syllable boundary and guarantees that the environment does not cross over to the next syllable.

This equation tells us that the vowels in such words as *Dan* /dæn/ will become nasalised to [dæ̃n], but the vowel in *dab* /dæb/ will not be affected and is pronounced [dæb] because /b/ is not a nasal segment. As well, a word such as *dan$druff* /dæn.dɹəf/ will be pronounced [dæ̃n.dɹəf], where we have shown the syllable boundary explicitly using the [.] diacritic. However, the first vowel in *door$man* /doː.mən/ /dɔ.mən/ will not be nasalised to the same degree, because the nasal segment occurs after the syllable boundary, so the 'within a syllable' condition is not met.

Technically, the equation is not complete because it specifies that the nasal segment must occur before the syllable boundary. Therefore, it will not generate nasal vowels in *dent* or *dents*, because there is no allowance for consonants to intervene between the nasal segment and the syllable boundary. We can indicate optional consonants within the syllable by using the cover symbol C for consonant and optionality by enclosing the C in parentheses. This new equation has the following appearance and covers nearly all cases:

V → [+nasal] / __ [+nasal] (C) (C) $

We would read this as:

Vowels become nasalised before a nasal segment, possibly followed by one or two consonants within a syllable.

Any rule written in formal notation such as this can be stated in words. The use of formal notation is a shorthand way of presenting the information, eliminating ambiguity and ensuring that the intended meaning of the rule is clear. Notation also reveals the phonological function more explicitly than words. It is easy to see in the formal statement that this is an assimilation process because the change to [+nasal] occurs before [+nasal] segments. Assimilation in languages reflects **coarticulation** – the spreading of phonetic features through gestural overlap in either the anticipation or in the perseveration (the carrying over) of articulatory processes. The auditory effect is that sounds flow together smoothly.

coarticulation
The spreading of phonetic features through gestural overlap in either the anticipation of, or perseveration (the carrying over) of, articulatory processes, e.g. vowels become [+nasal] when followed by consonants that are [+nasal] in the same syllable.

Aboriginal and Torres Strait Islander languages are interesting in that they show resistance to coarticulatory processes that could potentially reduce the contrast between segments. As described in Chapter 2, Australian Aboriginal languages have complex consonantal inventories that make use of a large number of places of articulation, particularly for stops and nasals. Consonant sequences that have different places of articulation, such as [nk] (alveolar nasal + velar stop) in the Walpiri word [ˈkinki] (devil) do not show assimilation of the nasal becoming more like [ŋ] (as would occur for English in a word like *incline*). Instead the [n] place of articulation is preserved.[9] This is likely to help ensure the distinctiveness of the nasal place of articulation.

The example in **Table 3.9** illustrates how vowel nasalisation in English applies to the phonemic representation of words and shows the assimilatory nature of the rule; that is, the change from no nasal feature present for the vowel in the phonemic representation to [+nasal] in the phonetic representation:

Table 3.9 Vowel nasalisation in English

	bit			bin		
Phonemic representation	/b	ɪ	t/	/b	ɪ	n/
Nasality: phonemic feature value	–	–	–	–	–	+
Apply nasalisation rule		NA*			↓	
Nasality: phonetic feature value	–	–	–	–	+	+
Phonetic representation	[b	ɪ	t]	[b	ɪ̃	n]

* Not applicable

Dissimilation

It is understandable that so many languages have assimilation processes; they permit greater ease of articulation and more fluid speech production. It might seem strange, then, to learn that languages also have **dissimilation** processes, in which a segment becomes less similar to another segment. Ironically, such processes have the same explanation: it is sometimes easier to articulate dissimilar sounds. The difficulty of tongue twisters, such as 'The sixth sheik's sixth sheep is sick', is based on the repeated similarity of sounds. If one were to make some sounds less similar, as in 'The third sheik's fourth sheep is sick', it would be easier to say. **Figure 3.1** makes the same point, with *toy boat* being more difficult to articulate repeatedly than *sail boat* because the two vowels in *toy* and *boat* are more similar to each other than the two vowels in *sail* and *boat*, and also because in *toy boat* the /t/ sounds at the beginning and end of the phrase come together when the phrase is repeated.

dissimilation
A phonological process that changes feature values of segments to make them less similar; e.g. a fricative dissimilation rule: /θ/ is pronounced [t] following another fricative. In English dialects with this rule, *sixth* /sɪks + θ/ is pronounced [sɪkst].

Figure 3.1 **Tongue twisters are difficult because of repeated similarity of sounds**

An example of easing pronunciation through dissimilation is found in some varieties of English, where there is a fricative dissimilation process. This process applies to sequences /fθ/ and /sθ/, changing them to [ft] and [st]. Here the fricative /θ/ becomes dissimilar from the preceding fricative by becoming a stop. The words *fifth* and *sixth*, for example, may come to be pronounced as if they were spelt *fift* and *sikst*.

A classic example of the same kind of dissimilation occurred in Latin. In some words a suffix *-alis* was added to nouns to form adjectives. When the suffix was added to a noun that contained the liquid /l/, the suffix was changed to *-aris*; that is, the liquid /l/ was changed to the dissimilar liquid /ɹ/. These words came into English as adjectives ending in *-al* or its dissimilated form *-ar*, as shown in the following examples:

-AL	-AR
anecdot-al	angul-ar
annu-al	annul-ar
ment-al	column-ar
pen-al	perpendicul-ar
spiritu-al	simil-ar
ven-al	vel-ar

All of the *-ar* adjectives contain an /l/ and, as *columnar* illustrates, the /l/ need not be the consonant directly preceding the dissimilated segment.

Though dissimilation is rarer than assimilation, it is nevertheless a process found throughout the world's languages. In the case of the Latin dissimilation discussed above, the feature [+lateral] is changed to [–lateral], so that /l/ is pronounced [ɹ]. Remember though that some English varieties are non-rhotic having lost final [ɹ].

Other feature-changing processes are neither assimilation nor dissimilation. The process in English that aspirates a voiceless stop at the beginning of a syllable simply adds a non-contrastive feature. Generally, aspiration in this context occurs only if the following vowel is the stressed vowel in the word. The /p/ in *pit* and *repeat* is an aspirated [p^h] but the /p/ in *compass* is an unaspirated [p]. A [–voice][–delayed release][–continuant] phoneme has [+aspirated] added to its feature matrix when it occurs at the beginning of a syllable containing a stressed vowel.

Aspiration is not specified in any phonemic feature matrix of English. The aspiration rule adds this feature related to the timing of the closure release, as discussed in the previous chapter, rather than in an attempt to make segments more alike or not alike, as with assimilation and dissimilation processes. In phonemic and phonetic feature matrices, the difference between speech sounds is made explicit, as shown in the following phonemic matrices in Table 3.10. The non-contrastive feature 'aspiration' is not included in these phonemic representations because aspiration is predictable from context.

Table 3.10 Phonemic feature matrix of English /p/ and /b/

	/p/	/b/	
Consonantal	+	+	
Continuant	–	–	
Labial	+	+	
Voice	–	+	← distinctive difference

Segment insertion and deletion

Phonological processes may also add or delete entire segments. These are different from the feature-changing and feature-adding processes we have seen so far, which affect only parts of segments. The process of inserting a consonant or vowel is called **epenthesis**.

epenthesis
The insertion of one or more phones in a word, e.g. the insertion of /ə/ in *children* to produce /ʧɪlədɹən/ instead of /ʧɪldɹən/.

In some non-rhotic varieties of English (those that don't have *r* sounds before a pause or a consonant, such as Australian English) the segment [ɹ] is optionally inserted after a non-high vowel to prevent two vowels being adjacent to one another. This is referred to as *r insertion* (or *r-sandhi*) and it may occur in Australian English and New Zealand English in a sequence like *law and order* between the words *law* and *order*/loːɹənoːdə/ /lɔɹənɔdə/. The simplified epenthetic rule would be: Insert [ɹ] after a non-high vowel when another vowel follows.

Segment deletion occurs in many languages and is far more common than segment insertion. For example, in casual or rapid speech we often delete the unstressed vowels that are shown in bold type in words like the following:

myst**e**ry gen**e**ral mem**o**ry fun**e**ral Barb**a**ra

These words in casual speech may sound as if they were written as:

mystry genral memry funral Barbra

In French, the vowel of the definite article (usually schwa) *le* and *la* is deleted (elided) before vowels. For example, 'the friend (female)' la + amie = *l'amie*, but not before consonants, e.g. 'the daughter' la + fille = *la fille*.

In the Australian languages from the Ngumpin group, suffixes that have an underlying nasal + stop cluster, such as /-ŋka/ (Locative) have a rule that deletes the nasal if the stem contains a nasal-stop cluster. This is an example of a dissimilation process but instead of feature changing, the process deletes a segment. The example from Gurindji (McConvell 1988:137) illustrates.[10]

lutcu- ŋka	'on the ridge'
wiɲci-ka	'at the spring'
pinka-ka	'at the river'

Reordering

Phonological processes may also reorder sequences of phonemes. The reordering process is called **metathesis**. For some speakers of English, the word *ask* is pronounced [ɐːks] but the word *asking* is pronounced [ɐːskĩŋ]. In this case metathesis reorders the /s/ and /k/ in certain contexts. In Old English, the verb was *aksian* with the /k/ preceding the /s/. Metathesis has historically switched these two consonants, producing *ask* in most varieties of English. Children's speech shows many cases of metathesis (which is lost as the child approaches the adult grammar); for example, *aminal* [æ̃mə̃nəɫ] for *animal* and *ephelent* [efələ̃nt] for *elephant* are common children's productions.

metathesis
The phonological process that reorders segments, often by transposing two sequential sounds, e.g. the pronunciation of *ask* in some English varieties as 'aks'.

Dog lovers have metathesised the Shet*l*and sheepdog into a shel*t*ie. Some Americans apply metathesis to the word *nuclear* (pronounced [njʉːkliːə] by Australians) to give [nukjələ˞].

We can see that phonological processes have several functions, among which are those included in Table 3.11.

Table 3.11 Some examples of phonological processes

Function	Example
1 Change feature values	Vowel nasalisation through assimilation in English
2 Add new features	Aspiration in English
3 Delete segments	Determiner vowel deletion in French
4 Add segments	Epenthesis – *r* sandhi in English
5 Reorder segments	Metathesis relating [ɐːsk] and [ɐːks]

These processes, when applied to the underlying representations of words and phrases, result in phonetic forms that differ from the underlying forms. They also allow us to understand the mapping between the phonological and phonetic representations. We learn these relationships when we are acquiring the language as children (see Chapter 7).

From one to many and from many to one

The relationship between the phonemes and phones of a language is complex and varied. A single phoneme is realised as several phones, as is the case with English voiceless stops that may be realised as aspirated or unaspirated, among other possibilities, and the English phoneme /t/, which has a wide range of different allophones. We also find the same phone may be the realisation of several different phonemes. Here is an example of that many-to-one relationship. We know that in English /t/ and /d/ are both phonemes, as is illustrated by the minimal pairs *tie/die* and *bat/bad*, but when a /t/ or /d/ occurs between a stressed and an unstressed vowel, either may be realised as a tap [ɾ]. For many speakers of English, *latter* and *ladder* are pronounced identically as [læɾə]; that is, they are homophones. Yet these speakers know that *latter* has a phonemic /t/, whereas *ladder* has a phonemic /d/. The tap process may be stated as the following rule:

An alveolar stop becomes a tap when preceded by a stressed vowel and followed by an unstressed vowel.

The application of this rule is illustrated as follows:

Word	latter	ladder
Phonemic representation	/læt + ə/	/læd + ə/
	↓	↓
Apply rule	ɾ	ɾ
Phonetic representation	[læɾə]	[læɾə]

This example illustrates that two distinct phonemes may be realised phonetically by the same phone.

The tap rule can be expressed formally as:

[+cor, +obst, –cont] → [ɾ] / [+stress, +V] ___ [–stress, +V]

Coronal non-continuant obstruents (alveolar oral stops) become taps between a stressed vowel and an unstressed vowel.

The allophone derived from the different phonemes /t/ and /d/ by the tap rule is different in features from all other phonemes in the language; that is, there is no /ɾ/ phoneme but there is an [ɾ] phone. This is also true of aspirated voiceless stops and nasalised vowels. The set of phones is larger than the set of phonemes and contains elements whose feature matrices are different from any feature matrix of any phoneme. The English tap rule also illustrates an important phonological process called **neutralisation** – the voicing contrast between /t/ and /d/ is potentially neutralised in the specified environment.

neutralisation
A phonological process that potentially removes the contrast between two phonemes in certain environments, e.g. in some **dialects** of English /t/ and /d/ are both produced as **voiced** taps between vowels, as in *writer* and *rider*, thus neutralising the voicing distinction.

Similar processes exist in other languages to show that there is no one-to-one relationship between phonemes and phones. In German, for example, voiced and voiceless obstruents occur as phonemes, as is shown by the following minimal pair:

Tier [tiːr] (animal) *dir* [diːr] (to you)

When voiced obstruents occur at the end of a word or syllable, they become voiceless. So, at the end of a German word, only [t] occurs. The words meaning ‘bundle’, *Bund* /bʊnd/, and ‘colourful’, *bunt* /bʊnt/, are pronounced [bʊnt] with a final [t]. Obstruent voicing is neutralised in syllable-final position.

The German devoicing rule changes the specifications of features. In German, the phonemic representation of the final stop in *Bund* is /d/, specified as [+voice]; it is changed to [–voice] to derive the phonetic [t] in word-final position. Again, this shows there is no simple relationship between phonemes and their allophones. German presents us with this picture:

German phonemes	/d/	/t/
	↓ ↘	↓
German phones	[d]	[t]

Devoicing in German provides a further illustration that it is difficult to discern the phonemic representation of a word given only the phonetic form; [bʊnt] can be derived from either /bʊnd/ or /bʊnt/. The phonemic representations and the phonological processes together determine the phonetic forms.

The function of phonological rules

The function of the phonological rules in a grammar is to provide the phonetic information about the processes necessary for the pronunciation of utterances. We may illustrate this point in the following way:

Input	*Phonemic (mental lexicon) representation of words in a sentence*
	↓
	Phonological rules
	↓
Output	*Phonetic (surface) representation of words in a sentence*

The input to the phonological rules is the phonemic representation. The phonological rules describe the processes that apply to the phonemic representation and produce as output the phonetic representation.

The application of rules in this way is called **derivation**. We have given examples of derivations that show how phonemically oral vowels become nasalised and how /t/ and /d/ become taps in certain environments. A derivation is therefore an explicit way of showing the effects and the function of phonological rules in a grammar.

derivation
The steps describing the processes that apply to an underlying form that result in a surface representation, e.g. in deriving a phonetic form from a phonemic form.

All the examples of derivations we have considered so far show the application of just one phonological rule. However, it is common for more than one rule to apply to a word. The word *patter*, for example, is phonemically /pætə/ but may be phonetically [pʰærə]. Two rules apply to it: the aspiration rule and the tap rule. We can derive the phonetic form from the phonemic representation as follows:

Underlying phonemic representation	/p	æ	t	ə/
Aspiration rule	pʰ			
Tap rule			ɾ	
Surface phonetic representation	[pʰ	æ	ɾ	ə]

Phonemic analysis: discovering phonemes

> Out of clutter, find simplicity. From discord, find harmony.
>
> Albert Einstein (1879–1955)

Children recognise phonemes at an early age, as we shall see in Chapter 7. Before reading this book or learning anything about phonology, you had an understanding that a *p* sound was a phoneme in English because it contrasts words like *pat* and *cat*, *pat* and *sat*, *pat* and *mat*. But you probably did not know that the *p* in *pat* and the *p* in *spat* are actually produced differently from one another. There is only one /p/ phoneme in English, but that phoneme has more than one allophone, including an aspirated one and an unaspirated one.

If a non-English-speaking linguist analysed English, how could this fact about the sound *p* be discovered? More generally, how do linguists discover the phonological system of any language? To do this they conduct a *phonemic analysis*. The important first step is to transcribe the words to be analysed in great phonetic detail. This is vital because we do not know in advance which phonetic features are contrastive and which are not.

Consider the following Finnish words:

Worked example

1	[kudot]	failures	5	[madon]	of a worm
2	[kate]	cover	6	[maton]	of a rug
3	[katot]	roofs	7	[ratas]	wheel
4	[kade]	envious	8	[radon]	of a track

Given these words, do the voiceless/voiced alveolar stops [t] and [d] represent different phonemes, or are they allophones of the same phoneme?

Here are a few hints as to how a phonologist might proceed:

1 Check to see if there are any minimal pairs.

2 Items (2) and (4) are minimal pairs: [kate], ‘cover’, and [kade], ‘envious’. Items (5) and (6) are minimal pairs: [madon], ‘of a worm’ and [maton], ‘of a rug’.

3 Conclude that [t] and [d] in Finnish represent the phonemes /t/ and /d/.

That was an easy problem. Now consider these data from Greek, focusing on the following sounds:

Worked example

[x] voiceless velar fricative
[k] voiceless velar stop
[c] voiceless palatal stop
[ç] voiceless palatal fricative

1	[kano]	do	9	[çeri]	hand
2	[xano]	lose	10	[kori]	daughter
3	[çino]	pour	11	[xori]	dances
4	[cino]	move	12	[xrima]	money
5	[kali]	charms	13	[krima]	shame
6	[xali]	plight	14	[xufta]	handful
7	[çeli]	eel	15	[kufeta]	bonbons
8	[ceri]	candle	16	[oçi]	no

To determine the status of [x], [k], [c] and [ç], answer the following questions.

1 Are there are any minimal pairs in which these sounds contrast?
2 Are any non-contrastive sounds in complementary distribution?
3 If non-contrasting phones are found, what are the phonemes and their allophones?
4 What are the phonological rules by which the allophones can be derived?

By analysing the data, we find that the velar consonants [k] and [x] contrast in a number of minimal pairs, for example, in [kano] and [xano]. [k] and [x] are therefore contrastive/phonemic. The palatal consonants [c] and [ç] also contrast in [çino] and [cino] and are therefore also contrastive/phonemic. But what about the velar fricative [x] and the palatal fricative [ç], and the velar stop [k] and the palatal stop [c]? We can find no minimal pairs that would conclusively show that these represent separate phonemes.

We now proceed to answer the second question: Are these non-contrasting phones – namely, [x] versus [ç] and [k] versus [c] – in complementary distribution? One way to see if sounds are in complementary distribution is to list each phone with the environment in which it is found, as follows:

Phone	Environment
[k]	before [a], [o], [u], [r]
[x]	before [a], [o], [u], [r]
[c]	before [i], [e]
[ç]	before [i], [e]

We see that [k] and [x] are not in complementary distribution; both occur before the same set of sounds. Nor are [c] and [ç] in complementary distribution; both occur before front vowels. But the stops [k] and [c] *are* in complementary distribution; [k] occurs before non-high-front vowels and [r], and never occurs before high front vowels. Similarly, [c] occurs only before high front vowels and never before non-high-front vowels or [r]. Finally, [x] and [ç] are in complementary distribution for the same reason. We therefore conclude that [k] and [c] are allophones of one phoneme, and the fricatives [x] and [ç] are also allophones of one phoneme. The pairs of allophones also fulfil the criterion of **phonetic similarity**. The first two are stops, the second are fricatives. (This similarity discourages us from pairing [k] with [ç] and [c] with [x], which are less similar to each other.)

phonetic similarity
The sharing of most of the same phonetic features by a set of sounds.

Which of the items within each allophone pair is more basic, hence the one whose features would best define the phoneme? When two allophones can be derived from one phoneme, we select the label for the underlying segment from the allophone that makes the rules as simple as possible. This was illustrated with English vowel nasalisation where the oral vowel was chosen as basic.

In the case of the velar and palatal stops and fricatives in Greek, the rules appear to be equally simple. However, in addition to the simplicity criterion, we wish to state rules that have natural phonetic explanations. Often these turn out to be the simplest solution. In many languages, velar sounds become palatal before front vowels. This is an assimilation process: palatal sounds are produced more towards the front of the mouth, as are front vowels, compared with velars, which are back consonants. Therefore, we select /k/ as the symbol for the phoneme with the allophones [k] and [c], and /x/ as a phoneme symbol with the allophones [x] and [ç].

We can now state the rule by which the palatals can be derived from the velars:

Velar consonants become palatal before high front vowels.

Using feature notation, we can state the rule as:

[+velar] → [+palatal] / ___ [–back][+high][+syllabic]

We do not need to include any features that are redundant in defining the segments to which the rule applies or the environment in which the rule applies for this example. Therefore, [+palatal] in the change part of the rule is sufficient, and the features [–back][+high] [+syllabic] suffice to specify the high front vowels. The simplicity criterion constrains us to state the rule as simply as we can. Finally, it is important to note that this analysis describes the data at hand, and further data may require a reanalysis of the situation. In 'real life' this is typically the case.

Phonotactics

The one-l lama
He's a priest.
The two-l llama
He's a beast.
And I will bet
A silk pyjama
There isn't any
Three-l lllama.

Suppose you were given the following four phonemes of English and asked to arrange them to form all *possible* English words:

/b/ /ɪ/ /k/ /l/

You would most likely produce the following:

/b	l	ɪ	k/
/k	l	ɪ	b/
/b	ɪ	l	k/
/k	ɪ	l	b/

These are the only permissible arrangements of the phonemes /b/, /ɪ/, /k/ and /l/ in English. */lbkɪ/, */ɪlbk/, */bkɪl/ and */ɪlkb/ are not possible English words. Although /blɪk/ and /klɪb/ are not now existing words, if you heard someone say, 'I just bought a beautiful new blick', you might ask, 'What's a blick?' However, if you heard someone say, 'I just bought a beautiful new bkli', you would be pretty baffled because *bkli* cannot be a word in English.

phonotactics Constraints governing the permissible sequences of **phonemes** and the possible location of phonemes in **syllables**, e.g. in English a word-initial nasal consonant may be followed only by a vowel; see also **possible word**, **nonsense word**, **accidental gap** (lexical gap).

Your knowledge of phonology includes information about what sequences of phonemes are permissible (licit) and what sequences are not. This is called **phonotactics**. The phonotactic features of a language relate to the permissible sequences of sounds and the permissible locations of sounds in syllables. For example, in English, if a syllable begins with /l/ or /ɹ/, the next segment must be a vowel. This is why */lbɪk/ does not sound like an English word – it violates the restrictions on the sequencing of phonemes. People who like to do crosswords or play Scrabble are often more aware of these constraints than the ordinary speaker, whose knowledge, as we have emphasised, may not be conscious.

Phonotactic constraints exist in all languages. Let us consider a few more examples from English. No more than three sequential consonants can occur at the beginning of an English syllable, and these three are restricted to /s/ + /p/, /t/, /k/ + /l/, /ɹ/, /w/, /j/. There are even restrictions if this condition is met. /stl/, for example, is not a permitted sequence, so **stlick* is not a possible word in English, but *spew* /spjʉː/ /spju/ is, along with *sclaff* /sklæf/, 'to strike the ground with a golf club', and *squint* /skwɪnt/.

/spl/ *splay*	/spɹ/ *spruce*	*/spw/ —	/spj/ *spew*
/skl/ *sclerosis*	/skɹ/ *screen*	/skw/ *squint*	/skj/ *skew*
*/stl/ —	/stɹ/ *streak*	*/stw/ —	/stj/ *student*

Other languages have different sequential restrictions. In Polish, *zl* and *kt* are permissible syllable initial combinations, as in /zlev/, 'a sink', and /kto/, 'who'. Croatian permits words such as the name *Mladen*. Japanese has severe constraints on what may begin a syllable; most combinations of consonants (e.g. /bl/, /sp/) are not permitted. Phonotactic constraints often have as their basis the syllable, rather than the word; that is, only the items that can begin a syllable can also begin a word, and only items that can end a syllable can end a word.

We have seen that English allows three consonants in the syllable onset as long as they satisfy the /s/ + [–voice] stop + approximant sequence. Many languages do not allow such complex onsets. Most Polynesian languages (e.g. Hawaiian and Māori) allow only a single consonant in the onset and no syllable coda consonants at all.[12] In the Akan dialect Twi of Ghana, a word may end only in a vowel or a nasal consonant. The sequence /pik/ is not a possible Twi word because it breaks the phonotactic rules of the language, whereas /mba/ is a word in Twi but not possible in English because /mb/ is not a legal onset in English. Australian languages have similar phonotactic constraints across the country. For example, they rarely use word onset clusters. Liquids are atypical in word-initial position, but stops, nasals and glides are common, and many languages, such as the Arandic languages, disallow consonants word finally.

In English multisyllabic words, it is possible for clusters that seem illegal to occur, for example, the /kspl/ in *explicit* /əksplısət/. However, there is a syllable boundary between the /k/ and /spl/, which we can make explicit using the IPA symbol for the syllable boundary, the full stop /ək.splıs.ət/. Thus, we have a permitted syllable coda /k/ that ends a syllable adjoined to a permitted onset /spl/ that begins a syllable. On the other hand, English speakers know that *condstluct* is not a possible word, because the second syllable would have to start with an illegal onset, either /stl/ or /tl/.

All languages have constraints on the permitted sequences and locations of phonemes in syllables; although different languages have different constraints. Just as spoken languages may have sequences of sounds that are not permitted, so too do sign languages have impossible combinations of features. Different sign languages make use of signs comprising different handshapes, orientation, location and movement, just as the constraints on sounds and sound sequences differ from one spoken language to another. A permissible sign in Chinese Sign Language may not be a permissible sign in Auslan, and vice versa. Children learn these constraints when they acquire the spoken or signed language, just as they learn what the phonemes are and how they are related to phonetic segments.

Lexical gaps

> The Mungle pilgriffs far awoy
> Religeorge too thee worled.
> Sam fells on the waysock-side
> And somforbe on a gurled,
> With all her faulty bagnose!
>
> John Lennon (1940–1980)

The words *bot* /bɔt/ /bɒt/ and *crake* /kɹæık/ /kɹeık/ are not known to all speakers of English, but they are words. On the other hand, /bʊt/ (to rhyme with *put*), *creck* /kɹek/ /kɹɛk/, *cruke* /kɹʉːk/ /kɹuk/, *cruck* /kɹɐk/ /krʌk/ and *crike* /kɹɑek/ /kɹaık/ are not now words in English, although they are possible words.

Advertising professionals often use possible but non-occurring words for the names of new products. Although we would hardly expect a new product or company to come on the market with the name *Zhleet* /ʒli:t/ /ʒlit/ – an impossible word in English – we do not bat an eye at *Velcro*, *Google*, *Frisbee* or *spam* because these once non-occurring words obey the phonotactic constraints of English.

A *possible word* contains legal phonemes in sequences that obey the phonotactic constraints of the language. An actual occurring word is the union of a possible word with a meaning. Possible words without meaning are sometimes called nonsense words (or non-words) and are also referred to as *accidental gaps* in the lexicon, or lexical gaps. Therefore 'words' such as *creck* and *cruck* are non-words that represent accidental gaps in the lexicon of English.

The production of morphemes

> The *t* is silent as in Harlow.
>
> Margot Asquith, referring to her name being mispronounced by Jean Harlow

Knowledge of phonology determines not only how we pronounce words, but also how we pronounce the parts of words we call morphemes. A morpheme is defined as the smallest meaning-bearing unit in language. For example, the English word *cats* has two meaning-bearing units (two morphemes) – represented orthographically as: cat + s. The first morpheme – *cat* –bears the meaning *Felis catus*, the domesticated species of a small carnivorous mammal. The second morpheme – *-s* – marks plurality (that there is more than one entity).

To take another example, the word *walked* consists of two morphemes – represented orthographically as: walk + ed. The first morpheme – *walk* – bears the meaning to advance by foot. The second morpheme – *-ed* – marks past tense (i.e. that the action took place in the past). Morphemes will be the topic of Chapter 4. Often, the pronunciation of individual morphemes varies depending on the phonetic context. Here we will introduce a way of describing this variation according to rules.

An illustration of allomorphs: English plurals

Nearly all English nouns have a plural form: *cat/cats*, *dog/dogs*, *fox/foxes*. But have you ever paid attention to how plural forms are pronounced? Listen to a native speaker of English (or yourself if you are one) produce the plurals of the following nouns.

A	B	C	D
cab	cap	kiss	child
pad	cat	bush	ox
bag	back	quiz	mouse
lathe	skiff	collage	criterion
ham	myth	match	sheep
can		badge	
wing			
hill			
bar			
boy			

The final sound of the plural nouns from column A is a [z] – a voiced alveolar fricative. For column B the plural ending is [s] – a voiceless alveolar fricative. And for column C it is [əz]. The regular plural morpheme is pronounced as either [z], [s] or [əz]. Note also that there is a pattern in columns A, B and C that does not exist in D. The plural forms in column D – *children*, *oxen*, *mice*, *criteria* and *sheep* – are a hotchpotch of special historical cases that are memorised individually when you learn English, whether natively or as a second language. This is because there is no way to predict the plural forms of these words. They are irregular forms.

How do we know how to pronounce the plural morpheme? The spelling, which adds *s* or *es*, is misleading – not a *z* in sight – yet if you are a native speaker of English, you know which variant of the morpheme to use. When faced with trying to understand this type of problem, it is useful to make a chart that records the phonological environments in which each variant is known to occur. The term for a variant of a morpheme (i.e. the alternative surface forms) is **allomorph**. The terminology is analogous to the phoneme/allophone distinction. Here are some examples of plural allomorphs based on the words from the previous example transcribed using a simplified phonetic transcription.

allomorph
Alternative surface form of a morpheme, e.g. the [s], [z] and [əz] forms of the plural morpheme in *cats*, *dogs* and *kisses*.

Allomorph	Preceding environment
[z]	[kʰæb], [pʰæd], [bæg], [læɪð] [hæ̃m], [kʰæ̃n], [wĩŋ], [hɪl], [bɐː] [boɪ]
[s]	[kʰæp], [kʰæt], [bæk], [skɪf], [mɪθ]
[əz]	[kʰɪs], [bʊʃ], [kwɪz], [kəlɐːʒ], [mætʃ], [bæʤ]

To discover the pattern behind the way plurals are pronounced, we look for a property of the environment associated with each group of allomorphs. What, for example, is it about [kʰæb] or [bæg] that determines that the plural morpheme will take the form [z] rather than [s] or [əz]?

To guide our search, we look for minimal pairs in our list of words. *Cab* [kʰæb] and *cap* [kʰæp], for example, is a minimal pair with items that differ only in the final segments, whereas *cat* [kʰæt] and *mat* [mæt] is a minimal pair that differs only in the initial segments. Other minimal pairs in the table above are *bag/back* and *bag/badge*.

Minimal pairs whose members take different allomorphs are particularly useful for our search. Consider *cab* [kʰæb] and *cap* [kʰæp], which take the allomorphs [z] and [s] respectively to form the plural. Clearly the final segment is responsible because that is where the two words differ. Similarly, for *bag* [bæg] and *badge* [bæʤ], the final segments determine the different plural allomorphs [z] and [əz].

Our analysis so far suggests that the distribution of allomorphs in English is conditioned by the final segment of the singular form. We can make our chart more concise by considering just the final segment: (Remember from Chapter 2 that we treat diphthongs as single segments.)

Allomorph	Preceding environment
[z]	[b], [d], [g], [ð], [m], [n], [ŋ], [l], [ɐː], [oɪ]
[s]	[p], [t], [k], [f], [θ]
[əz]	[s], [ʃ], [z], [ʒ], [tʃ], [ʤ]

We now want to understand why the English plural follows this pattern. We need to answer questions of this type by inspecting the *phonetic properties* of the conditioning segments. Such an inspection reveals that the segments that trigger the [z] plural have in common the property of being *voiced*. *Voiceless* segments take the [s] plural and the sounds that take the [əz] plural are all fricatives and affricates of the sibilant type. Now the rules can be stated in more general terms:

Allomorph	Environment
[z]	After voiced non-sibilant segments
[s]	After voiceless non-sibilant segments
[əz]	After sibilant segments

An even more concise way to express this variation is to propose that the basic (underlying) form of the plural morpheme is /z/. We can now determine when the default does *not* apply. We can pose the following rules to explain the alternations that occur in the shape of the plural morpheme:

1 Insert a schwa [ə] before the plural morpheme /z/ when a regular noun ends in a sibilant, giving rise to [əz].
2 Change the plural morpheme /z/ to voiceless [s] when preceded by a voiceless sound.

These rules will derive the correct pronunciations of plurals for all regular nouns. Because we have suggested that the basic form of the plural is /z/, if no rule applies then the plural morpheme will be realised as [z]. (Note that we could also have suggested that /s/ is the basic form of the plural, but then the rule would have to be changed to accommodate this and the solution would not be as elegant). The following chart shows how the plurals of *miss*, *mitt* and *mid* are formed. At the top are the basic forms. The two rules apply (or not as appropriate) as one moves downward. The output of rule 1 becomes the input of rule 2. At the bottom are the results of applying the rules in the correct order.

	miss + pl.	mitt + pl.	mid + pl.
Basic representation	/mɪs + z/	/mɪt + z/	/mɪd + z/
Apply rule 1	ə	NA*	NA*
Apply rule 2	NA*	s	NA*
Resulting form	[mɪsəz]	[mɪts]	[mɪdz]

*Not applicable.

As we have formulated these rules, 1 must apply before 2. If we applied the rules in reverse order, we would derive an incorrect form for the plural of *miss*, as a diagram similar to the previous one illustrates:

Basic representation	/mɪs + z/
Apply rule 2	s
Apply rule 1	ə
Resulting form	*[mɪsəs]

morphophonemic rules
Rules that describe the pronunciation of morphemes; a **morpheme** may have more than one variant (allomorphs) that can be explained by such rules, e.g. the plural morpheme in English.

The particular rules that describe the form of the plural morpheme and other morphemes of the language are **morphophonemic rules**. Such rules concern the pronunciation of specific morphemes. Therefore, the plural morphophonemic rules apply to the plural morpheme specifically, not to all morphemes in English.

An illustration of allomorphs: English past tense

The formation of the regular past tense of English verbs parallels the formation of regular plurals. Like plurals, some irregular past tenses conform to no particular rule and must be learnt individually, such as *go/went*, *sing/sang* and *hit/hit*. Like plurals, there are three past-tense allomorphs for regular verbs: [d], [t] and [əd]. Here are several examples transcribed using a simplified phonetic transcription. Study sets A, B and C and try to see the regularity before reading further.

Set A	grab	[gɹæb]	grabbed	[gɹæbd]
	rig	[ɹɪg]	rigged	[ɹɪgd]
	use	[jʉːz]	used	[jʉːzd]
	scam	[skæ̃m]	scammed	[skæ̃md]
	ski	[skiː]	skied	[skiːd]
Set B	rip	[ɹɪp]	ripped	[ɹɪpt]
	look	[lʊk]	looked	[lʊkt]
	kiss	[kʰɪs]	kissed	[kʰɪst]
	patch	[pʰætʃ]	patched	[pʰætʃt]
Set C	plait	[plæt]	plaited	[plætəd]
	skid	[skɪd]	skidded	[skɪdəd]
	pat	[pʰæt]	patted	[pʰætəd]
	land	[læ̃nd]	landed	[læ̃ndəd]

Set A suggests that if the verb ends in a voiced segment (consonant or vowel), you add a voiced [d] to form the past tense. Set B suggests that if the verb ends in a voiceless segment, you add a voiceless [t] to form the past tense. Set C shows us that if the verb ends in the oral alveolar stops [t] or [d], [əd] is added, reminding us of the insertion of a schwa to form the plural of nouns that end in sibilants.

Just as /z/ was chosen as the basic form of the plural morpheme, /d/ might be considered the basic form of the past-tense morpheme, and the rules used to describe past-tense formation of regular verbs are much like the rules for the plural formation of regular nouns. These are also morphophonemic rules that apply specifically to the past-tense morpheme /d/. As with the plural rules, the output of rule 1, provides the input to rule 2 and the rules must be applied in order.

1 Insert [ə] before the past-tense morpheme when a regular verb ends in a non-nasal alveolar stop, giving [əd].
2 Change the past-tense morpheme [d] to a voiceless [t] when a voiceless sound precedes it.

Two further examples of English allomorphs are the possessive morpheme and the third-person singular morpheme, spelt *s* or *es*. These morphemes take on the same phonemic form as the plural morpheme, according to the same rules. Add [s] to *ship* to get *ship's*, add [z] to *woman* to get *woman's* and add [əz] to *judge* to get *judge's*. Similarly, for the verbs *eat*, *need* and *rush*, the third-person singular forms are *eats* with a final [s], *needs* with a final [z] and *rushes* with a final [əz].

The rules for describing the formation of regular plurals, possessive forms and third-person singular verb agreement in English all require epenthesis (segment insertion). Here is the first part of the plural formation rule:

Insert a [ə] before the plural morpheme [z] when a regular noun ends in a sibilant, giving [əz].

Letting the symbol Ø stand for 'null', we can write this morphophonemic epenthesis rule more formally as 'null becomes schwa between two sibilants' or like this:

Ø → ə / [+sibilant] ___ [+sibilant]

Similarly, the first part of the rule for regular past-tense formation in English is:

Insert a [ə] before the past-tense morpheme [d] when a regular verb ends in a non-nasal alveolar stop, giving [əd].

This epenthesis rule may also be expressed in our more formal notation:

Ø → ə / [–nasal][+coronal][–continuant] ___ [–nasal][+coronal][–continuant]

There is a plausible explanation for insertion of a [ə]. If we merely added a [z] to a word like *quiz* to form its plural, we would get [kwɪzz] (ending in a long [z] consonant), which would be hard for English speakers to distinguish from [kwɪz] with a single [z]. Similarly, if we added just [d] to *skid* to form its past tense, it would be [skɪdd] (having a long [d]), which would also be difficult to distinguish from [skɪd], because in English we do not contrast long (geminate) and short consonants (as described in Chapter 2). These and other examples suggest that the morphological patterns in a language are closely related to other generalisations about the phonology of that language.

That the rules of phonology are based on properties of segments and syllables rather than on individual words is one of the factors that make it possible for young children to learn their native language in a relatively short period. The young child does not need to learn each plural, each past tense, each possessive form and each verb ending on a noun-by-noun or verb-by-verb basis – once the rule is learnt, thousands of word forms are automatically known. And as we will see when we discuss language development in Chapter 7, children give clear evidence of learning morphophonemic rules, such as the plural rules, by applying the rule too broadly and producing forms such as *mouses*, *mans* and so on, which are not grammatical words in the adult language.

An illustration of allomorphs: Akan negation

Most languages have morpheme variation that can be described by rules similar to the ones we have written for English. The negative morpheme in the language Akan, for example, also has three nasal allomorphs: [m] before *p*, [n] before *t* and [ŋ] before *k*, as the following examples show:

mɪ pɛ	I like	mɪ mpɛ	I don't like
mɪ tɪ	I speak	mɪ ntɪ	I don't speak
mɪ kɔ	I go	mɪ ŋkɔ	I don't go

homorganic nasal rule

A phonological **assimilation rule** that changes the place of articulation feature of a nasal consonant to agree with that of a following consonant, e.g. /n/ becomes [ŋ] when preceding /k/, as in *incomplete*.

homorganic consonants

Two sounds produced at the same place of articulation, e.g. /m/ and /p/; and /t/, /d/ and /n/.

Changes to the production of nasal consonants as just illustrated is described by the **homorganic nasal rule**, a common assimilation rule in the world's languages – although as described above, Australian languages have a tendency to resist the homorganic nasal rule. **Homorganic consonants** are those that share the same place of articulation. In the homorganic nasal rule described above for Akan, the place of articulation of the nasal is matched to that of the following consonant – bilabial, alveolar or velar. The same process occurs in English, where the negative morpheme prefix *in-* or *im-* agrees in place of articulation with the word to which it is prefixed, so we have *impossible* [ĩmp^{h}ɔsəbəɫ], *intolerant* [ĩnt^{h}ɔləɹə̃nt] and *incongruous* [ĩŋk^{h}ɔ̃ŋɡɹʉːəs]. The rule makes two consonants that appear next to each other more similar.

The rule that describes this case of allomorphy is:

Change the place of articulation of a nasal consonant to agree with the place of articulation of a following consonant.

Prosodic phonology

As discussed in Chapter 2, the phonetic features of length, pitch and loudness combine in speech to give language its tune and rhythm adding meaning to syllables, words and phrases. Prosody may serve to tell us something of the emotional state of the speaker, to express sarcasm or irony, to add emphasis or nuance to an utterance, or to indicate grammatical structure. In tone languages the pitch of individual vowels or syllables is used to contrast meanings of words.

Syllable structure

Syllables are the building blocks of words. Each word is composed of one or more syllables and each syllable is a phonological unit composed of one or more phonemes. Every syllable has a **nucleus**, which is usually a vowel, but which may be a syllabic liquid or nasal in the phonetic output. The nucleus is the part of the syllable that has the most acoustic energy. Depending on the language, the nucleus may be preceded by one or more consonants called the syllable **onset** and followed by one or more consonants called the syllable **coda**. From a very early age, children learn that certain words rhyme. The nucleus and the coda of the final syllable in rhyming words are identical, as the following nursery rhyme illustrates:

Jack and J**ill**

Went up the h**ill**

To fetch a pail of water

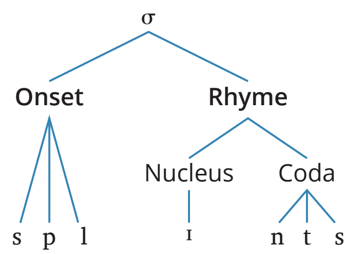
Jack fell d**own**

And broke his cr**own**

And Jill came tumbling after.

For this reason, the nucleus + coda constitute the subsyllabic unit called a **rhyme** (some linguists use the spelling *rime*).

A syllable therefore has a hierarchical structure. Using the Greek letter *sigma*, σ, to represent the syllable, the hierarchical structure of the monosyllabic word *splints* can be shown:



nucleus
That part of a syllable that has the greatest acoustic energy; the vowel portion of a syllable, e.g. /æ/ in /pæt/ *pat*.

onset
One or more consonants that precede the syllable nucleus, e.g. /st/ in /stæmp/ *stamp*.

coda
One or more consonants that follow the nucleus of a syllable, e.g. /mp/ in /stæmp/ *stamp*.

rhyme
The **nucleus** + **coda** of a **syllable**, e.g. the /æt/ of /kæt/ *cat*.

Word stress

In many languages, including English, one or more of the syllables in every content word (i.e. every word except for function words, such as *to*, *the*, *a*, *of*) is stressed. A stressed syllable, which can be marked by an acute accent (´) over the vowel, is perceived as more prominent than unstressed syllables in the following examples:

récord	(noun)	as in	My neighbour broke the record.
recórd	(verb)	as in	I want to record your thoughts.
súbject	(noun)	as in	Let’s change the subject.
subjéct	(verb)	as in	He will subject us to criticism.

These pairs show that word stress can be contrastive in English. In these cases it distinguishes between nouns and verbs.

Stress is a property of the syllable rather than a segment; it is a prosodic feature. To produce a stressed syllable, we may change the pitch (i.e. by raising or lowering it), make the syllable longer, and/or sometimes also make it louder. We often use all three of these phonetic characteristics to create syllable stress.

Some words may contain more than one stressed syllable, but exactly one of the stressed syllables is more prominent than the others when the words are spoken in isolation. The vowel that receives this *primary* stress is marked by an acute accent. The other stressed vowels are indicated by a grave accent (`) over the vowels (these vowels receive *secondary* stress).

rèsignátion	lìnguístics	fùndaméntal	ìntrodúctory	rèvolútion

Native speakers of a language like English generally know which syllable receives primary stress, which ones receive secondary stress and which ones are unstressed. It is part of their knowledge of the language which develops during childhood. It is usually easy to distinguish between stressed and unstressed syllables because the vowel in unstressed syllables is often pronounced as schwa [ə], particularly in Australian and New Zealand English. There are other unstressed vowels, for example in the final syllables of *city*, [iː] and *potato* [əʉ]. It may be harder to distinguish between primary and secondary stress. If you are unsure of where the primary stress is in a word (and you are a native speaker of English), try shouting the word as if trying to make a person understand you across a busy street. Often, the difference in stress becomes more apparent. Note that the difference between primary and secondary stress usually disappears when words are spoken as part of longer stretches of speech, such as phrases.

There are several ways to represent stress. We have used acute accent (´) marks for primary stress and grave accent (`) marks for secondary stress. We can also specify in the transcription which syllable in the word is stressed using the diacritics [ˈ] for primary stress and [ˌ] for secondary stress. For example, when spoken in isolation the word *acquisition* /ˌækwəˈzɪʃən/ has primary stress on the third syllable and secondary stress on the first syllable. The other syllables are unstressed.

The stress pattern of a word may differ across the varieties of English. In British, Australian and New Zealand English the word *labóratory* [ləbˈɔɹətɹiː] has only one stressed syllable, and in most varieties of American English it has two: *láboratòry* [ˈlæbəɹəˌtʰɔɹi]. Because the vowel qualities in English are closely related to whether they are stressed, the British, Australian and New Zealand vowels differ from the American vowels in this word; in fact, the American version, may have an extra vowel because the fourth vowel may be deleted in the British, Australian and New Zealand production.

Sentence and phrase stress

> 'What can I do, Tertius?' said Rosamond, turning her eyes on him again. That little speech of four words, like so many others in all languages, is capable by varied vocal inflexions of expressing all states of mind from helpless dimness to exhaustive argumentative perception, from the completest self-devoting fellowship to the most neutral aloofness.
>
> George Eliot, *Middlemarch*, 1872

When words are combined into phrases and sentences, one syllable in the phrase receives greater stress (focus) than all others. Just as there is only one primary stress in a word spoken in isolation, only one of the syllables in a phrase (or sentence) receives the main stress, or *nuclear accent*. (If you think about it, a word spoken in isolation is simply a phrase that has a single nuclear accent.) All of the other stressed syllables in the phrase are reduced to secondary stress and the remaining syllables are unstressed. In English, we place primary stress on the adjectival part of a compound noun (which may be written as one word, two words separated by a hyphen or two separate words), but we place the stress on the noun when the words are a noun phrase consisting of an adjective followed by a noun. The differences between the following pairs are therefore predictable:

Compound noun	Adjective + noun
tíghtrope (a rope for acrobatics)	tight rópe (a rope drawn taut)
Rédcoat (a British soldier)	red cóat (a coat that is red)
hót dog (a frankfurt)	hot dóg (an overheated dog)
Whíte House (the President's house)	white hóuse (a house painted white)

Say these examples aloud and at the same time listen to or feel the stress pattern. If English is not your native language, listen to a native speaker say them.

These pairs show that stress may be predictable from the morphology and syntax, indicating that the phonology interacts with the other components of the grammar. The stress differences between the noun and verb pairs discussed in the previous section (e.g. the words *record* and *subject* as nouns or verbs) are often predictable from the syntactic word category.

Intonation

In Chapter 2, we discussed pitch as an important feature of both tone languages and intonation languages and we considered the role that pitch plays in determining meaning. Pitch is a phonemic feature in tone languages, such as Mandarin, Thai and Akan. In these languages the relative pitches and pitch contours are the **contrasting tones** used to differentiate between words. Conversely, in intonation languages, such as English, pitch still plays an important role, but in the form of the pitch contour or intonation of the phrase or sentence, rather than being phonemically contrastive for different words.

contrasting tones
In **tone languages**, different **tones** that make different words, e.g. in Nupe, *bá* with a high tone and *bà* with a low tone mean 'be sour' and 'count' respectively.

In English, intonation may reflect syntactic or semantic differences. If we say *John is going* with a falling pitch at the end of the phrase, it is a statement, but if the pitch rises at the end, it may be interpreted as a question. Similarly, *What's in the tea, honey?* may, depending on intonation, be a query to someone called 'honey' regarding the contents of the tea (falling intonation on *honey*) or a query regarding whether the tea contains honey (rising intonation on *honey*).

A sentence that is ambiguous in writing may be unambiguous when spoken because of differences in the pitch contour and the position of the nuclear accent. Here is a somewhat more subtle example. Written, sentence (1) is unclear as to whether Tristram intended for Isolde to read and follow directions or to merely follow him:

1 Tristram left directions for Isolde to follow.

Spoken, if Tristram wanted Isolde to follow him, the sentence would be pronounced with a rise in pitch on the first syllable of *follow*, followed by a fall in pitch, as indicated (oversimplistically) in sentence (2):

2 Tristram left directions for Isolde to follow.

In the production of this sentence, the nuclear accent is on the word *follow*. If the meaning is for Isolde to read and follow a set of directions, the highest pitch comes on the second syllable of *directions*, as illustrated, again oversimplistically, in sentence (3), where the nuclear accent is on the word *directions*:

3 Tristram left directions for Isolde to follow.

The way we have indicated pitch ignores much detail. Before the big rise in pitch, the voice does not remain on the same monotone low pitch. These pitch diagrams merely indicate when there is a special change in pitch.

Pitch plays an important role in tone languages and in intonation languages, but in different ways, depending on the phonological system of the respective languages.

Many speakers of Australian and New Zealand English use a particular intonation pattern known as the high rising tune (HRT), or uptalk.[13] This is an intonation type characterised by rising inflection on grammatically declarative phrases. Rising intonation is commonly associated with questions but the HRT does not have a questioning function. Instead it is considered a discourse device used to engage the listener and signal the inclusive nature of the interaction. The HRT is used by both men and women.

Approaches to phonology

In this chapter we have discussed the idea that the phonological rules used to describe the processes of phonology help us to explain the relationship between underlying forms and surface forms; that is, the phonemic and phonetic levels of abstraction. But why do these kinds of grammars have phonological rules at all? In other words, why do underlying or phonemic forms not come to the surface intact rather than undergoing various changes?

In an earlier part of this chapter we discussed phonotactic constraints, which are part of our knowledge of phonology. As we saw, phonotactic constraints specify which sound sequences are permissible in a particular language, so that in English *blick* is a possible word but **lbick* is not. Many phonologists believe that phonological rules exist to ensure that the surface or phonetic forms of words do not violate phonotactic constraints. If underlying forms remained unmodified they may violate the phonotactics of the language.

Consider, for example, the English past-tense rule and recall that it has two sub-parts. The first inserts a schwa when a regular verb ends in an alveolar stop (/t/ or /d/), as in *mated*. The second devoices the past-tense morpheme /d/ when it occurs after a voiceless sound, as in *ripped* /ɹɪpt/ or *picked* /pɪkt/. Notice that the part of the rule that devoices /d/ reflects the constraint that English words may not end in a sequence consisting of a voiceless stop + /d/. Words such as */lɪpd/ and */mɪkd/ do not exist, nor could they exist. They are impossible words of English.

More generally, there are no words that end in a sequence of obstruents whose voicing features do not match. Therefore, words such as */kæsb/, where the final two obstruents are [–voice][+voice], are not possible, nor are words such as */kæbs/ whose final two obstruents are [+voice][–voice]. On the other hand, /kæsp/ and /kæbz/ are judged to be possible words because the final two segments agree in voicing. There appears to be a general constraint in English, stated as follows:

(A) Obstruent sequences may not differ with respect to their voice feature at the end of a syllable.

We can see then that the devoicing part of the past-tense rule creates a change in the past-tense morpheme to create a surface form that conforms to this general constraint.

Similarly, the schwa insertion part of the past-tense rule creates possible sound sequences from impossible ones. English does not generally permit sequences of sounds within a single syllable that are very similar to each other, such as [kk], [kg], [gk], [gg], [pp], [sz] and [zs]. Words spelt with double consonants, such as *egg* [eg] or *knitting* [nɪtĩŋ], do not contain phonetically doubled consonants. Therefore, the schwa insertion rule separates sequences of sounds that are otherwise not permitted in the language because they are too similar to each other, for example, the sequence of /d/ and /d/ in /lænd/ + past tense /d/, which becomes *landed* [læ̃ndəd]; or /t/ and /d/ in /pæt/ + past tense /d/, which becomes *patted* [pʰætəd]. The relevant constraint is stated as follows:

(B) Sequences of obstruents that differ at most with respect to voicing are not permitted within English words.

Constraints such as (A) and (B) are far more general than particular rules, like the past-tense rule. For example, constraint (B) might also explain why an adjective such as *smooth* turns into the abstract noun *smoothness*, rather than taking the affix *-th* [θ], as in *wide/width*, *broad/breadth* and *deep/depth*. Suffixing *smooth* with *-th* would result in a sequence of two similar obstruents, [smʉːðθ], which differ only in their voicing feature. This suggests that languages may ensure that constraints are satisfied across a range of different grammatical contexts.

Therefore, some phonological rules exist because languages have general principles that constrain possible sequences of sounds. The rules specify minimal modifications that bring the forms in line with the surface constraints.

Optimality Theory

It has also been proposed that a universal set of phonological constraints exists and that this set is ordered, with some constraints being more highly ranked than others. The higher the constraint is ranked, the more influence it exerts on the language. This proposal, known as **Optimality Theory**,[14] also holds that the particular constraint rankings can differ from language to language, and that the different rankings generate the different sound patterns shown across languages. Constraint (B) (i.e. *sequences of obstruents that differ at most with respect to voicing are not permitted within English words*) is highly ranked in English, and so we have the English past-tense rule, as well as many other rules, including the plural rule (with some modification), that change sequences of sounds that are too similar. Constraint (B) is also highly ranked in other languages; for example, Modern Hebrew, in which suffixes that begin with /t/ are always separated from stems ending in /t/ or /d/ by inserting [e], as in /kiʃat + ti/ → [kiʃateti], meaning 'I decorated'. In Berber, similar consonants, such as [tt], [dd], [ss] and so on, can surface at the end of words from underlying /tt/, /dd/ and /ss/. In this language, constraint (B) is not highly ranked. Other constraints outrank it and therefore exert a stronger effect on the language; notably, constraints that want the surface forms not to deviate from corresponding underlying forms. These constraints, known as faithfulness constraints, compete in the rankings with constraints that modify the underlying forms. Faithfulness constraints reflect the drive among languages for morphemes to have single identifiable forms, a drive that is in competition with constraints such as (A) and (B).

Optimality Theory
The hypothesis that a universal set of ranked phonological constraints exists, where the higher the constraint is ranked, the more influence it exerts on the language; e.g. in English, one constraint is the following: **obstruent** sequences may not differ with respect to their voice feature at the end of a word.

An exemplar-based approach to phonology

The ideas discussed in this chapter are based on an abstractionist approach to phonology where generalisations about the language (i.e. the rules or constraints) are stored separately from the underlying forms of words in the mental lexicon. According to this approach, the surface forms that we produce and perceive are derived from processes that apply to the underlying forms. The underlying form is therefore an abstraction and devoid of phonetic detail associated with the output, including details of the speaker and context. **Exemplar theories** instead propose that exemplars of a particular item that an individual has experienced are stored in memory (i.e. in 'exemplar clouds'). Exemplars are stored along with a great deal of associated information, including speaker-specific detail, such as gender, age and social group membership, and also contextual detail, such as the formality of the speaking situation. The idea is that full phonetic detail is retained rather than ignored as is the case in abstractionist models. Rather than proposing a separate set of phonological processes and their rules that relate underlying to surface representations, exemplar theory proposes that generalisations about language emerge from the store of exemplars based on distributional probability. This means that the characteristics of phonetic and phonological units can emerge from the various patterns of stored exemplars and their frequency distributions.

exemplar theories
Theories of phonology that consider that words are stored in memory along with their acoustic, social and contextual information intact.

Ongoing research based on exemplar theories and abstractionist phonological models have recently led researchers to propose that aspects of both approaches are needed to fully explain phonological representation. It is likely that a hybrid approach is warranted that incorporates a representational level of abstract categories that contain minimal phonetic detail, along with a separate level of representation where rich phonetic detail is retained in memory. Both levels of representation feed into each other to provide us with the ability to use generalisations necessary to rapidly adapt to novel phonetic situations, and to also use detailed memories to interpret phonological patterns specific to individuals and contexts.[15]

CHAPTER REVIEW

Summary

Part of our knowledge of a language is knowledge of the phonology or sound system of that language. It includes the inventory of phonemes (i.e. the abstract sound units that differentiate words); the possible phones (i.e. the realisation of these phonemes in the phonetic output); the appropriate context-specific allophones; the legal sequences and locations of speech segments; and the prosody associated with individual words and whole utterances.

Phonetic segments are represented by symbols enclosed in square brackets [ ] and phonemes are indicated between slant brackets (forward slashes) / /. Phones in the same environment that differentiate words, such as the [b] and [m] in *bat* [bæt] and *mat* [mæt], represent distinct phonemes, /b/ and /m/. When similar phones occur in complementary distribution, they are allophones (i.e. predictable phonetic variants) of phonemes. For example, in English, aspirated voiceless stops, such as the initial sound in *pill*, are in complementary distribution with the unaspirated voiceless stops in words such as *spill*. Therefore, the aspirated [pʰ] and the unaspirated [p] are allophones of the phoneme /p/.

All sound segments are composed of features such as voiced, nasal, labial and continuant, whose presence or absence can be indicated by + or – signs in phonological feature systems. They distinguish one segment from another. When a feature creates a contrast between words, as nasality does in *bet* and *met*, it is a contrastive feature. Therefore, in English, the binary valued feature [±nasal] is a contrastive feature, whereas [±aspiration] is not.

Phonetic features that are predictable are non-contrastive. The nasality of vowels in English is a predictable non-contrastive feature because vowels are nasalised before nasal consonants. A feature may therefore be contrastive in one class of sounds and non-contrastive in another. Nasality is contrastive for English consonants and non-contrastive for English vowels. Features that are non-contrastive in one language may be contrastive in another. Aspiration is contrastive in Thai and non-contrastive in English; both aspirated and unaspirated voiceless stops are phonemes in Thai.

When two distinct words are distinguished by a single phone occurring in the same position, they constitute a minimal pair (e.g. *fat* /fæt/ and *vat* /væt/). Minimal pairs also occur in sign languages. Signs may contrast by handshape, orientation, location, and movement.

To discover the phonemes of a language, linguists can use a methodology called phonemic analysis, which involves looking for patterns in the distribution of sounds occurring in a language, in particular to expose contrastiveness and complementary distribution.

The phonemes are not the actual phonetic sounds but are abstract constructs in the mind of the language user that are realised as sounds by the operation of rules/constraints such as those described in this chapter. Native speakers do not have to be taught these rules. They are acquired during childhood and become part of the unconscious knowledge of our language.

In abstractionist theories of grammar, the relationship between the phonemic representation of words and sentences (underlying representation) and the phonetic representation (the pronunciation of these words and sentences – i.e. the surface representation) is described with reference to phonological rules or constraints. Various processes may be applied to underlying phonological representations to derive their phonetic form; for example, the process that nasalises vowels in English before nasal consonants can be described through an assimilation rule that changes the feature values of segments. There are dissimilation processes that make sequences of segments different from each other, epenthetic processes that insert segments, and deletion processes that delete segments. We can use formal notation to write rules to reveal linguistic generalisations about phonological processes.

Phonological processes and their associated rules/constraints generally refer to entire classes of sound. These are natural classes, characterised by a small set of phonetic features shared by all the members of the class, for example, [–continuant], [–voiced], to designate the natural class of voiceless stops.

The phonology of a language includes constraints on the sequences and location of phonemes in the syllables of the language (phonotactics). Such constraints allow us to determine whether a sequence of segments is a *possible* but non-occurring word in a language, or whether a phonetic string is illegal. For example, *blick* [blɪk] is not now an English word but it could become one, whereas **kbli* [kbliː] or **ngos* [ŋɔs] could not.

Words in some languages may also be phonemically distinguished by prosodic or suprasegmental features, such as pitch, segment duration and loudness. Languages in which syllables are contrasted by pitch or pitch change are called tone languages. Intonation languages, on the other hand, do not use tone to contrast between segmentally identical items but may use pitch variations to distinguish meanings of phrases and sentences.

Optimality Theory hypothesises a universal set of ranked constraints in which higher-ranked constraints take precedence over lower-ranked ones, with the system motivating and governing the phonological output in specific languages.

Exemplar-based theories of phonology instead consider words to be distributions of exemplars stored in memory along with their acoustic, social and contextual information intact. In these theories there is no need for underlying representations and rules. Generalisations about language are instead said to emerge from the full set of remembered exemplars based on probability distributions.

Newer theories of phonology are emerging that combine aspects of both abstractionist and exemplar phonology.

Exercises

All the data in languages other than English are given in phonetic transcription (without square brackets) unless otherwise stated. The phonetic transcriptions of English words are given within square brackets. Various dialects of English are represented below and are transcribed according to their specific pronunciation. Note that languages other than English may contain sounds that require a wide range of different phonetic symbols. Refer to **Figure 2.6** (Chapter 2) for the full IPA chart of symbols.

1 The following sets of minimal pairs show that English /p/ and /b/ contrast in word initial, medial and final positions.

Initial	Medial	Final
pit/bit	rapid/rabid	cap/cab

Find similar sets of minimal pairs for each pair of consonants given:

a	/t/ /d/	d	/f/ /v/	g	/s/ /ʃ/
b	/m/ /n/	e	/d/ /n/	h	/ʧ/ /ʤ/
c	/l/ /ɹ/	f	/p/ /f/	i	/n/ /ŋ/

2 After a head injury, a young hospital patient appears to have lost the spelling-to-pronunciation (grapheme to phoneme) and pronunciation-to-spelling (phoneme to grapheme) rules that most of us use to read and write new words or nonsense strings. He also is unable to access the phonemic representation of words in his lexicon. Consider the following examples of his reading pronunciation (transcribed phonemically for Australian English) and his writing from dictation (also transcribed for this dialect of English):

Stimulus	Dictated word	Reading pronunciation	Writing from dictation
fame	/fæɪm/ /feɪm/	/fæmiː/ /fæmi/	FAM
cafe	/kæfæɪ/ /kæfeɪ/	/sæfiː/ /sæfi/	KAFA
time	/tɑem/ /taɪm/	/tɑemiː/ /taɪmi/	TIM
note	/nəʉt/ /noʊt/	/nəʉtiː/ /noʊti/	NOT
praise	/pɹæɪz/ /pɹeɪz/	/pɹæ-ɑe-siː/ /pɹæ-aɪ-si/	PRAZ
treat	/tɹiːt/ /tɹit/	/tɹiː-æt/ /tɹi-æt/	TRET
goes	/gəʉz/ /goʊz/	/gəʉ-es/ /goʊ-ɛs/	GOZ
float	/fləʉt/ /floʊt/	/fləʉ-æt/ /floʊ-æt/	FLOT

What rules or patterns relate his reading pronunciation to the written stimulus? What rules or patterns relate his spelling to the dictated stimulus? For example, in reading, a corresponds to /æ/; in writing from dictation /æ/ corresponds to written *A*.

3 Consider the distribution of [ɾ] (an alveolar tap) and [l] in Korean in the following words. (Some simplifying changes have been made in these transcriptions, and those in exercise 4, which have no bearing on the problems.)

ɾubi	ruby	mul	water
kiɾ-i	road (nom.)	pal	arm
saɾam	person	səul	Seoul
iɾum-i	name (nom.)	ilgop	seven
ɾatio	radio	ibalsa	barber

a Are [ɾ] and [l] allophones of one or two phonemes?
b Do they occur in any minimal pairs?
c Are they in complementary distribution?
d In what environments does each occur?
e If you conclude that they are allophones of one phoneme, state the rule that can derive the phonetic allophonic forms.

4 The following are some additional data from Korean:

son	hand	ʃihap	game
som	cotton	ʃilsu	mistake
sosəl	novel	ʃipsam	thirteen
sek	colour	ʃinho	signal
isa	moving	maʃita	is delicious
sal	flesh	oʃip	fifty

a Are [s] and [ʃ] allophones of the same phoneme, or is each an allophone of a separate phoneme? Give your reasons.
b If you conclude that they are allophones of one phoneme, state the rule that can derive the phonetic allophones.

5 In Southern Kongo, a Bantu language spoken in Angola, the alveolar segments [t], [s], [z] are in complementary distribution with their postalveolar counterparts [tʃ], [ʃ], [ʒ], as shown in the following words:

tobola	to bore a hole	tʃina	to cut
tanu	five	tʃiba	banana
kesoka	to be cut	ŋkoʃi	lion
kasu	emaciation	nselele	termite
kunezulu	heaven	aʒimola	alms
nzwetu	our	lolonʒi	to wash house
zevo	then	zeŋga	to cut
ʒima	to stretch	tenisu	tennis

a State the distribution of each pair of segments. (Assume that the non-occurrence of [t] before [e] is an accidental gap.)

Example:	[t]–[tʃ]: [t] occurs before [o], [a] and [u]; [tʃ] occurs before [i]
	[s]–[ʃ]:
	[z]–[ʒ]:

b Using considerations of simplicity, which symbol should be used as the underlying phoneme for each pair of non-palatal and palatal segments in Southern Kongo?

c State in your own words the *one* phonological rule that will derive all the phonetic segments from the phonemes. Do not state a separate rule for each phoneme; a general rule can be stated that will apply to all three phonemes you listed in (b). Try to give a formal statement of your rule.

d **Challenge exercise:** Which of the following are possible in Southern Kongo and which are not based on your analysis? Explain why.

i [tenisi] ii [lotʃunuta] iii [zevoʒiʒi] iv [ʃiʃi] v [ŋkasa] vi [iʒiloʒa]

6 In some varieties of English, the following words have different vowels, as is shown by the simplified phonetic transcriptions of this specific dialect:

A		B		C	
site	[sʌɪt]	side	[saɪd]	sigh	[saɪ]
lice	[lʌɪs]	lies	[laɪz]	lye	[laɪ]
stripe	[stɹʌɪp]	scribe	[skɹaɪb]	shy	[ʃaɪ]
strife	[stɹʌɪf]	strives	[stɹaɪvz]	tie	[taɪ]
dike	[dʌɪk]	dime	[daɪm]	dye	[daɪ]
		nine	[naɪn]		
		rile	[ɹaɪl]		
		dire	[daɪə]		
		writhe	[ɹaɪð]		

a How may the classes of sounds that end the words in columns A and B be characterised? That is, what feature specifies all the final segments in A and all the final segments in B?

b How do the words in column C differ from those in columns A and B?

c Are [ʌɪ] and [aɪ] in complementary distribution? Give reasons for your answer.

d If [ʌɪ] and [aɪ] are allophones of one phoneme, should they be derived from /ʌɪ/ or /aɪ/? Why?

e Give the **phonetic** representations of the following words as they would be spoken in the variety of English described here:

i write
ii guides
iii rise
iv mile
v strike
vi rice.

f Formulate a rule that will relate the phonemic representations to the phonetic representations of the words given above.

g Give the **phonemic** representations of the following words as they would be spoken in this variety of English:

i write
ii guides
iii rise
iv mile
v strike
vi rice.

7 Consider these data from a common German dialect ([x] is a velar fricative; [ç] is a palatal fricative; and : indicates a long vowel).

nɪçt	not	ba:x	Bach
ʁe:çə̃n	rake	la:xə̃n	to laugh
ʃlɛçt	bad	kɔxt	cooks
ʁi:çə̃n	to smell	fɛɐ̯zu:xə̃n	to try
hãɪmlɪç	sly	ho:x	high
ʁɛçts	rightward	ʃlʊxt	canyon
kʁi:çə̃n	to crawl	fɛɐ̯flu:xt	accursed

a Are [x] and [ç] allophones of the same phoneme, or is each an allophone of a separate phoneme? Give your reasons.

b If you conclude that they are allophones of one phoneme, state the rule that can derive the phonetic allophones.

8 Pairs such as *top* and *chop*, *dunk* and *junk*, *so* and *show*, and *Caesar* and *seizure* reveal that /t/ and /ʧ/, /d/ and /ʤ/, /s/ and /ʃ/, and /z/ and /ʒ/ are separate phonemes in English. Consider these same pairs of alveolar and postalveolar consonants in the following data. The postalveolar forms often occur in casual speech. This process is sometimes called palatalisation in phonology because the alveolar sounds are changed so that they are produced more towards the palatal place of articulation. Note that this is a different process from phonetic palatalisation where the palatal gesture is a secondary articulation.

Non-Palatalised		Palatalised	
[hɪt mi:]	hit me	[hɪʧʉ:]	hit you
[li:d hɪm]	lead him	[li:ʤʉ:]	lead you
[pʰɐ:s ɐs]	pass us	[pʰɐ:ʃʉ:]	pass you
[lʉ:z ðem]	lose them	[luʒʉ:]	lose you

Formulate the rule that specifies when /t/, /d/, /s/ and /z/ become postalveolar affricates and fricatives [ʧ], [ʤ], [ʃ] and [ʒ]. Restate the rule using feature notations. Does the formal statement reveal the generalisations?

9 Here are some words modified from Japanese. Note that [ts] is an alveolar affricate and should be taken as a single segment, just like the postalveolar affricate [ʧ]. It is pronounced as the initial sound in *t*sunami. Japanese words (except certain loan words) never contain the phonetic sequences *[ti] or *[tɯ].

tatami	mat	tomodaʧi	friend	ɯʧi	house
tegami	letter	totemo	very	otoko	male
ʧiʧi	father	tsɯkɯe	desk	tetsɯdaɯ	help
ʃita	under	ato	later	matsɯ	wait
natsɯ	summer	tsɯtsɯmɯ	wrap	ʧizɯ	map
kata	person	tatemono	building	te	hand

a Based on these data, are [t], [ʧ] and [ts] in complementary distribution?

b State the distribution – first in words, then using features – of these phones.

c Give a phonemic analysis of these data insofar as [t], [ʧ] and [ts] are concerned. That is, identify the phonemes and the allophones.

d Give the phonemic representation of the modified phonetically transcribed Japanese words shown. For the purposes of this question, assume phonemic and phonetic representations are the same except for [t], [ʧ] and [ts].

tatami	tsɯkɯe	tsɯtsɯmɯ
tomodaʧi	tetsɯdaɯ	ʧizɯ
ɯʧi	ʃita	kata
tegami	ato	koto
totemo	matsɯ	tatemono
otoko	degɯʧi	te
ʧiʧi	natsɯ	tsɯɾi

10 The following words are Paku, a language spoken by the Pakuni in the NBC television series *Land of the Lost* (a language created by V Fromkin). The acute accent indicates a stressed vowel.

ótu	evil (N)	mpósa	hairless
túsa	evil (Adj)	ã́mpo	hairless one
etógo	cactus (sg)	ãmpṍni	hairless ones
etogṍni	cactus (pl)	ã́mi	mother
Páku	Paku (sg)	ãmĩ́ni	mothers
Pakṹni	Paku (pl)	áda	father
épo	hair	adã́ni	fathers

a Is stress predictable? If so, what is the rule?
b Is nasalisation a distinctive feature for vowels? Give the reasons for your answer.
c How are plurals formed in Paku?
d What is the plural of hair?

11 Consider the following English words. Those in column A have stress on the next-to-last (penultimate) syllable, whereas the verbs in column B and C have their last syllable stressed.

A	B	C
radish	cement	ablaze
carrot	resist	approve
famine	prevent	advise
model	result	divine
elliptic	adopt	achieve
lattice	enlist	alone

Transcribe the words under columns A, B and C phonemically, e.g. *radish* /ɹæɪʃ/, *cement* /səment/ /səmɛnt/, *ablaze* /əblæɪz/ /əbleɪz/.

a Consider the phonemic structure of the stressed syllables in these verbs. What is the difference between the final syllables of the verbs in columns A and B? Formulate a rule that predicts where stress occurs in the verbs in columns A and B.
b In the verbs in column C, stress also occurs on the final syllable. What must you add to the rule to account for this fact? (*Hint*: For the forms in columns A and B, the final consonants had to be considered; for the forms in column C, consider the vowels.)

12 The phonemic transcriptions of ten 'words' are given below. Some are English words, some are not words now but are possible words or nonsense words, and others are not possible because they violate English phonotactic constraints.

Write the English words in regular spelling. Mark the other words as *possible* or *not possible*. For each word you mark as *not possible*, state your reason.

	Word	Possible	Not possible	Reason if not possible
Example:				
/plæt/	plait			
/slɪg/		x		
/lsɪg/			x	No English word can begin with a liquid followed by an obstruent.

		Word	Possible	Not possible	Reason
a	/glɪs/				
b	/skɹætʃ/				
c	/blækt/				
d	/æpz/				
e	/ŋiː/ /ŋi/				
f	/jæp/				
g	/dlɪʃəs/				
h	/knɪə/				
i	/fæʃ/				
j	/æpəzɪʃən/				

13 Consider these phonetic forms of Hebrew words:

[v]– [b]		[f]– [p]	
bika	lamented	litef	stroked
mugbal	limited	sefer	book
ʃavar	broke (masc.)	sataf	washed
ʃavra	broke (fem.)	para	cow
ʔikev	delayed	mitpaxat	handkerchief
bara	created	haʔalpim	the Alps

Assume that these words and their phonetic sequences are representative of what may occur in Hebrew. In your answers, consider classes of sounds rather than individual sounds.

a Are [b] and [v] allophones of one phoneme? Are they in complementary distribution? In what phonetic environments do they occur? Can you formulate a phonological rule stating their distribution?

b Does the same rule, or lack of a rule, that describes the distribution of [b] and [v] apply to [p] and [f]? If not, why not?

c The following word has one phone missing. A blank appears in place of the missing sound: *hid__ik*. Tick the one correct statement.
   - i [b] but not [v] could occur in the empty slot.
   - ii [v] but not [b] could occur in the empty slot.
   - iii Either [b] or [v] could occur in the empty slot.
   - iv Neither [b] nor [v] could occur in the empty slot.

d Which of the following statements is correct about the incomplete word __*ana*?
   - i [f] but not [p] could occur in the empty slot.
   - ii [p] but not [f] could occur in the empty slot.
   - iii Either [p] or [f] could occur in the empty slot.
   - iv Neither [p] nor [f] could occur in the empty slot.

e Consider the following possible words (in phonetic transcription):

laval	surva	labal	palar	falu	razif

If these words actually occurred in Hebrew, which of the following would they do?

i Force you to revise the conclusions about the distribution of labial stops and fricatives that you reached on the basis of the first group of words given above.

ii Support your original conclusions.

iii Neither support nor disprove your original conclusions.

14 Consider these data from the African language Maninka:

bugo	hit	*bugoli*	hitting
dila	repair	*dilali*	repairing
don	come in	*donni*	coming in
dumu	eat	*dumuni*	eating
gwen	chase	*gwenni*	chasing

a What are the two forms of the 'ing' morpheme?

b Can you predict which phonetic form will occur? If so, state the rule.

c What are the -ing forms for the following verbs?

i da, 'lie down'

ii famu, 'understand'

iii men, 'hear'

d What does the rule that you formulated predict for the 'ing' form of sunogo, 'sleep'

e If your rule predicts *sunogoli*, modify it to predict *sunogoni* without affecting the other occurrences of -li. Conversely, if your rule predicts *sunogoni*, modify it to predict *sunogoli* without affecting the other occurrences of -ni.

15 Consider the following phonetic data from the Bantu language Luganda (the data have been somewhat altered to make the problem easier). In each line except the last, the same root form occurs in both columns A and B, but it has one prefix in column A, meaning 'a' or 'an', and another prefix in column B, meaning 'little'. Assume a phonetic transcription.

A		B	
ẽnato	a canoe	aka:to	little canoe
ẽnapo	a house	aka:po	little house
ẽnobi	an animal	akaobi	little animal
ẽmpipi	a kidney	akapipi	little kidney
ẽŋko:sa	a feather	akako:sa	little feather
ẽm:ã:m:o	a peg	akabã:m:o	little peg
ẽŋ:õ:m:e	a horn	akagõ:m:e	little horn
ẽn:ĩmiro	a garden	akadĩmiro	little garden
ẽnugẽni	a stranger	akatabi	little branch

Base your answers to the following questions on only these forms. For this exercise assume that all the words in the language follow the regularities shown here. Note that long segments represented by [:] are the same as a doubled segment. For example [m:] is equivalent to [mm], and [õ:] is equivalent to [õõ].

a Are nasal vowels in Luganda predictable (phonemic)?

b What is the phonemic representation of the morpheme meaning 'canoe'?

c What is the phonemic representation of the morpheme meaning 'garden'? Explain the difference between the forms for 'a garden' and 'little garden'.

d Is there a homorganic nasal rule in Luganda? Explain.
e Which of the following forms is the phonemic representation for the prefix meaning ‘a’ or ‘an’?
  i /en/
  ii /ẽn/
  iii /em/
  iv /ẽm/
  v /eŋ/
f If the phonetic representation of the word meaning ‘little boy’ is [akapo:be], give the phonemic and phonetic representations for ‘a boy’.
g What are the *phonemic* and *phonetic* representations of the word meaning ‘a branch’?
h What are the *phonemic* and *phonetic* representations of the word meaning ‘little stranger’?
i State the three phonological rules revealed by the Luganda data.
j **Challenge exercise:** Is ordering of the rules necessary? Explain.
k **Challenge exercise:** If /am/ represents a bound prefix morpheme in Luganda, can you conclude that [ãmdãno] is a possible phonetic form for a word in this language starting with this prefix?
l **Challenge exercise:** If /am/ represents a bound prefix morpheme in Luganda and /amdano/ is a possible underlying form for a word in this language give the phonetic surface form.

16 Here are some Japanese verb forms represented with modified phonetic transcription. They represent two styles (informal and formal) of present-tense verbs. Morphemes are separated by +.

Gloss	Informal	Formal
call	job + ɯ	job + imasɯ
write	kak + ɯ	kak + imasɯ
eat	tabe + ɾɯ	tabe + masɯ
see	mi + ɾɯ	mi + masɯ
leave	de + ɾɯ	de + masɯ
go out	dekake + ɾɯ	dekake + masɯ
die	ʃin + ɯ	ʃin + imasɯ
close	ʃime + ɾɯ	ʃime + masɯ
swindle	kata + ɾɯ	kata + masɯ
wear	ki + ɾɯ	ki + masɯ
read	jom + ɯ	jom + imasɯ
lend	kas + ɯ	kaʃ + imasɯ
wait	mats + ɯ	matʃ + imasɯ
press	os + ɯ	oʃ + imasɯ
apply	ate + ɾɯ	ate + masɯ
drop	otos + ɯ	otoʃ + imasɯ
have	mots + ɯ	motʃ + imasɯ
win	kats + ɯ	katʃ + imasɯ
steal a lover	neto + ɾɯ	neto + masɯ

a According to the data presented here, list each of the Japanese verb roots in their phonemic representations.
b Formulate the rule that accounts for the different phonetic forms of these verb roots in the formal and informal contexts.
c There is more than one allomorph for the suffix designating formality and more than one for the suffix designating informality. List the allomorphs of each. Formulate the rule or rules for their distribution.

17 Consider these data from the Native American language Ojibwa.[16] (The data have been somewhat altered for the sake of simplicity; [c] is a palatal stop.)

anok:i:	she works	nitanok:i:	I work
a:k:osi	she is sick	nita:k:osi	I am sick
aje:k:osi	she is tired	kiʃaje:k:osi	you are tired
ine:ntam	she thinks	kiʃine:ntam	you think
ma:ca:	she leaves	nima:ca:	I leave
takoʃ:in	she arrives	nitakoʃ:in	I arrive
pakiso	she swims	kipakiso	you swim
wi:sini	she eats	kiwi:sini	you eat

- **a** What forms do the morphemes meaning 'I' and 'you' take; that is, what are the allomorphs?
- **b** Are the allomorphs for 'I' in complementary distribution? How about for 'you'?
- **c** Assuming that we want one phonemic form to underlie each allomorph, what should it be?
- **d** State a rule that derives the phonetic forms of the allomorphs. Make it as general as possible; that is, refer to a broad natural class in the environment of the rule. You may state the rule formally, in words or partially in words with some formal abbreviations.
- **e** Is the rule a morphophonemic rule; that is, does it (most likely) apply to specific morphemes but not in general? What evidence do you see in the data to suggest your answer?

18 Consider these data from the Burmese language, spoken in Myanmar.[17] The voiceless diacritic is the small ring under the nasal consonants indicating a voiceless nasal.

mă	hard	ŋ̥ă	borrow
nă	pain	n̥ʷa	peel
ŋă	fish	n̥ă	nose
nʷă	cow	m̥ă	notice

Is voicing of nasals a contrastive or predictable feature of Burmese? Present evidence to support your conclusion.

19 Here are some short sentences in a made-up language called Wakanti. (Long consonants are written as doubled symbols to make the analysis easier.)

[aba]	I eat	[amma]	I don't eat
[ideɪ]	You sleep	[inneɪ]	You don't sleep
[aguʊ]	I go	[aŋŋuʊ]	I don't go
[upi]	We come	[umpi]	We don't come
[atu]	I walk	[antu]	I don't walk
[ika]	You see	[iŋka]	You don't see
[ijama]	You found out	[injama]	You didn't find out
[aweli]	I climbed up	[amweli]	I didn't climb up
[ioa]	You fell	[inoa]	You didn't fall
[aie]	I hunt	[anie]	I don't hunt
[ulamaba]	We put on top	[unlamaba]	We don't put on top

- **a** What is the phonemic form of the negative morpheme based on these data?
- **b** What are its allomorphs?
- **c** State a rule that derives the phonetic form of the allomorphs from the underlying phonemic form.
- **d** Another phonological rule applies to these data. State explicitly what the rule does and to what natural class of consonants it applies.
- **e** Give the phonemic forms for all the negative sentences.

20 Consider these pairs of semantically related phonetic forms and glosses in Australian English (the + indicates a morpheme boundary).

Phonetic	Gloss	Phonetic	Gloss
[bɔ̃m]	explosive device	[bɔ̃mb+ɐːd]	to attack with explosive devices
[kɹ̥ẽm]	a morsel or bit	[kɹ̥ẽmb+əl]	to break into bits
[ɑeæ̃m]	a metrical foot	[ɑeæ̃mb+ɪk]	consisting of metrical feet
[θẽm]	an opposable digit	[θẽmb+əlĩːnə]	a tiny woman of fairy tales

- **a** What are the two allomorphs of the root morpheme in each line of data?
- **b** Suggest the phonemic form of the underlying root morpheme. (*Hint*: Consider pairs such as *atom*/*atomic* and *form/formal* before you decide.)
- **c** State a rule that derives the allomorphs.
- **d** Spell these words using the English alphabet.

21 Consider the following data from Hebrew. (*ts* is an alveolar sibilant affricate and should be considered one sound, just as *ch* in English stands for the postalveolar affricate [tʃ]. The word *lehit* is a reflexive pronoun.)

Non-sibilant-initial verbs		Sibilant-initial verbs	
kabel	to accept	*tsadek*	to justify
lehit-kabel	to be accepted	*lehits-tadek*	to apologise
		(not **lehit-tsadek*)	
pater	to fire	*shamesh*	to use for
lehit-pater	to resign	*lehish-tamesh*	to use
		(not **lehit-shamesh*)	
bayesh	to shame	*sader*	to arrange
lehit-bayesh	to be ashamed	*lehis-tader*	to arrange oneself
		(not **lehit-sader*)	

- **a** Describe the phonological process taking place in the second column of Hebrew data.
- **b** Describe in words as specifically as possible a phonological rule that accounts for the change. Make sure your rule does not affect the data in the first column of Hebrew.

22 Here are some Japanese data, in a modified phonetic transcription, showing voiceless vowels (the ones with the voiceless diacritic under them).

Word	Gloss	Word	Gloss	Word	Gloss
tatami	mat	tomodatʃi	friend	ɯtʃi	house
tegami	letter	totemo	very	otoko	male
sɯ̥kijaki	sukijaki	ki̥setsɯ	season	bɯsata	silence
tʃi̥tʃi	father	tsɯ̥kɯe	desk	tetsɯdaɯ	help
ʃi̥ta	under	ki̥ta	north	matsɯ	wait
degɯtʃi	exit	tsɯɾi	fishing	ki̥setsɯ	mistress
natsɯ	summer	tsɯ̥tsɯmɯ	wrap	tʃizɯ	map
kata	person	fɯ̥ton	futon	fɯgi	discuss
matsɯ̥ʃita	a name	etsɯ̥ko	girl's name	fɯ̥kɯan	a plan

- **a** Which vowels may be voiceless? What feature do they share?
- **b** Are they in complementary distribution with their voiced counterparts? If so, state the distribution.
- **c** Are the voiced/voiceless pairs allophones of the same phoneme?

d State in words, or write in formal notation if you can, the rule for determining the allophones of the vowels that have voiceless allophones.

e **Challenge exercise:** Write in formal notation the rule for determining the allophones of the vowels that have voiceless allophones.

23 We described a rule of word-final obstruent devoicing in German. (Recall that German /bʊnd/ is pronounced [bʊnt]). This rule could be considered a manifestation of the constraint: *Voiced obstruents are not permitted at the end of a word*.

Given that this constraint is considered universal, how would you explain that English *band* is nevertheless pronounced [bænd], not [bænt], in terms of Optimality Theory?

24 **Challenge exercise:** For some English speakers, word-final /z/ is devoiced when the /z/ represents a separate morpheme. These speakers pronounce plurals, such as *dogs*, *days* and *dishes*, as [dɔgz̥], [dæɪz̥] and [dɪʃəz̥] instead of [dɔgz], [dæɪz] and [dɪʃəz]. Furthermore, they pronounce possessives, such as *Dan's*, *Jay's* and *Liz's*, as [dæ̃nz̥], [ʤæɪz̥] and [lɪzəz̥] instead of [dæ̃nz], [ʤæɪz] and [lɪzəz]. Finally, they pronounce third-person singular verb forms, such as *reads*, *goes* and *fusses*, as [ɹiːdz̥], [gəʉz̥] and [fɐsəz̥] instead of [ɹiːdz], [gəʉz] and [fɐsəz]. (However, words such as *daze* and *Franz* are still pronounced [dæɪz] and [fɹæ̃nz], because the /z/ is not a separate morpheme.

How might Optimality Theory explain this phenomenon?

25 **Challenge exercise:** In German, the third-person singular suffix is *-t*. Following are three German verb stems (underlying forms) and the third-person forms of these verbs:

Stem	Third person	
/loːb/	[loːpt]	he praises
/zag/	[zakt]	he says
/raɪz/	[raɪst]	he travels

The final consonant of the verb *stem* undergoes devoicing in the third-person form, even though it is not at the end of the word. What constraint is operating to devoice the final stem consonant? How is this similar or different from the constraint that operates in the English plural and past tense?

26 Consider the endings of the first word in the following French phrases:

[pəti tablo]	small picture
[no tablo]	our pictures
[pəti livʀ]	small book
[no livʀ]	our books
[pəti nave]	small turnip
[no nave]	our turnips
[pətit ami]	small friend
[noz ami]	our friends
[pətit wazo]	small bird
[noz wazo]	our birds

a What are the two forms for the words *small* and *our*?

b What are the phonetic environments that determine the occurrence of each form?

c Propose the phonemic form for *small* and *our*.

d State a rule in words that derives the surface forms from the underlying forms.

e **Challenge exercise:** state the rule formally, using Ø to represent 'null' and # to represent a word boundary.

27 Consider the following data from Māori[18]

Active	Passive	Gerundive (verb functioning as adjective)	
wero	werohia	werohaŋa	stab
hopu	hopukia	hopukaŋa	catch
aru	arumia	arumaŋa	follow
mau	mauria	mauraŋa	carry
awhi	awhitia	awhitaŋa	embrace
inu	inumia	inumaŋa	drink

a Propose underlying representations for the stem forms of the five verbs based on these data alone.

b Explain the surface forms of the active set of verbs.

28 We all make speech errors (slips of the tongue) that tell us interesting things about language and its use. Consider the following speech errors.

	Intended utterance	Actual utterance
a	gone to seed	god to seen
	[gɔ̃n tə siːd]	[gɔd tə sĩːn]
b	clear blue sky	glear plue sky
	[klɪə blʉː skɑe]	[glɪə plʉː skɑe]
c	peas and beans	bees and peans
	[pʰiːz ə̃n bĩːnz]	[biːz ə̃n pʰĩːnz]

In each example explain how the resulting surface (phonetic) form is generated in terms of the processes of aspiration, voicing and nasalisation.

Further reading

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Weblinks

- https://www.ozclo.org.au – OzCLO is a volunteer run competition. It challenges students to develop their own strategies for solving problems in fascinating real languages. Past papers and solutions provide students with additional practice materials.
- http://accent.gmu.edu – This archive presents a large set of speech samples from a variety of language backgrounds. You can compare the accents of different English speakers.
- http://www.linguistics.ucla.edu/people/hayes/120a/Pheatures – This program helps you learn phonological features through practice. It is free, cross-platform software, copyrighted by the Regents of the University of California, programmed by Floris van Vugt in consultation with Bruce Hayes and Kie Zuraw.
- http://www.linguistics.ucla.edu/people/hayes/120a/PhonologyPad.htm – Another great resource for the phonology student. Phonology Pad lets you practise phonology problems and will point out problems in your analysis (without telling you the answer!) It is a free, cross-platform program, copyrighted by the Regents of the University of California developed by Bruce Hayes and Daniel Albro.

Endnotes

1 As reported in Greene, A 1969, *Pullet surprises*, Scott, Foresman & Co, Glenview, IL.

2 The MD system is based on contrast alone and not on production. Therefore, it is not suitable as the basis of a phonetic transcription of Australian English. Hence, only the HCE system of vowel transcription can be used for phonetic transcription as this is aligned to the IPA and more accurately reflects Australian English vowel production.

3 The distinctive feature set used in the chapter has been adapted from Gussenhoven, C and Jacobs, H 2005, *Understanding phonology*, 2nd edn, Hodder Education, London.

4 [ɫ] is the symbol for the velarised alveolar lateral approximant, otherwise known as dark /l/, which occurs in syllable-final position in many English dialects, including Australian English.

5 Refer to Hayes, B 2009, *Introductory phonology*, Wiley-Blackwell, Chichester.

6 Both /l/ and /ɹ/ can be syllabic in English, but /ɹ/ is only syllabic in Australian English in certain restricted connected speech contexts.

7 Syllabic /l/ is always dark in Australian English [ɫ].

8 An overview of articulatory phonology can be found in Browman, C and Goldstein, L 1992, 'Articulatory phonology: An overview', in *Haskins Laboratories Status Report on Speech Research*, SR-111/112, 23–42.

9 See Fletcher, J and Butcher, A 2014, Sound patterns of Australian languages, in Koch, H and Nordlinger, R (eds) *The Languages and Linguistics of Australia: A Comprehensive Guide*, De Gruyter, Berlin, pp. 89–136.

10 The rules of dissimilation in the language are complex as described in Baker, B 2014, Sound patterns of Australian languages, in Koch, H and Nordlinger, R (eds) *The Languages and Linguistics of Australia: A Comprehensive Guide,* De Gruyter, Berlin, pp. 139–214. See also, McConvell, P 1988, Nasal cluster dissimilation and constraints on phonological variables in Gurindji and related languages. *Aboriginal Linguistics*, *1*,135–165.

11 From Nash, O 1931, *Candy is dandy: The best of Ogden Nash*, published by André Deutsch. Copyright © 1931 by Ogden Nash, renewed. Reprinted by permission Curtis Brown, Ltd. and Welbeck Publishing Ltd.

12 Harlow, R 2007, *Māori: An introduction*, Cambridge University Press, Cambridge, UK.

13 For a recent account of the high rising tune (HRT) with reference to origins, geographical spread and social influence, see Warren, P 2016, *Uptalk: The phenomenon of rising intonation*, Cambridge University Press, Cambridge, UK.

14 For an in-depth account of Optimality Theory, see Kager, R 1999, *Optimality Theory*, Cambridge University Press, Cambridge, UK.

15 See Pierrehumbert, J B 2016, Phonological representation: Beyond abstract versus episodic, *Annual Review of Linguistics*, *2*: 33–52.

16 From Baker, C L and McCarthy, J 1981, *The logical problem of language acquisition*, MIT Press, Cambridge, MA. Reprinted by permission of MIT Press.

17 From Ladefoged P and Maddieson, I 1996, *The sounds of the world's languages*, Blackwell, Oxford, UK, p. 111.

18 Hohepa, P 1967, *A profile generative grammar of Māori*. Baltimore: Indiana University at the Waverly Press. See also Hale K 1973. Deep-surface canonical disparities in relation to analysis and change: an Australian example. In Hoenigswald Henry M (ed), *Diachronic, areal, and typological linguistics* Berlin, De Gruyter, pp. 401–458.

4 Morphology: the words of language

A word is dead When it is said, Some say. I say it just Begins to live That day.

Emily Dickinson, 'A word is dead', *Complete Poems*

Learning objectives

After reading Chapter 4, you should be able to:

- explain the difference between content words and function words
- identify morphemes as the minimal units of meaning
- identify types of morphemes, including roots, stems and the different types of affixes
- explain the difference between derivational morphology and inflectional morphology
- understand the hierarchical structure of morphologically complex words
- understand the morphological similarity between spoken and sign languages
- understand principles of basic morphological analysis.

Every speaker of every language knows tens of thousands of words. Unabridged dictionaries of English contain nearly half a million entries, but most speakers do not know all of these words. It has been estimated that a six-year-old child knows as many as 13 000 words and the average high school graduate about 60 000. A university graduate presumably knows many more than that, but whatever our level of education we learn new words throughout our lives, such as words in this book that you will learn for the first time.

Words are an important part of linguistic knowledge and constitute a component of our mental grammars, but one can learn thousands of words in a language and still not know the language. Anyone who has tried to communicate in a foreign country by merely using a dictionary knows this is true. However, without words we would be unable to convey our thoughts through language or understand the thoughts of others.

Someone who does not know English would not know where one word begins or ends in an utterance such as 'Thecatsatonthemat'. We separate written words by spaces, but in the spoken language there are no pauses between most words. Without knowledge of the language, one cannot tell how many words are in an utterance. Knowing a word means knowing that a particular sequence of sounds is associated with a particular meaning. A speaker of English has no difficulty in segmenting the stream of sounds into six individual words – *the*, *cat*, *sat*, *on*, *the* and *mat* – because each of these words is listed in his or her mental dictionary or **mental lexicon** (the Greek word for 'dictionary'), which is part of a speaker's linguistic knowledge. Similarly, a speaker knows that *uncharacteristically*, which has more letters than *Thecatsatonthemat*, is nevertheless a single word.

mental lexicon
The internalised knowledge native speakers (signers) have about the pronunciation, morphological structure, syntactic properties, and meaning of words.

The lack of pauses between words in speech has provided humourists with much material. The comical hosts of the show *Car Talk*, aired on the American National Public Radio, close the show by reading a list of credits that includes the following cast of characters:

Copyeditor	Adeline Moore	(Add a line more)
Accounts payable	Ineeda Czech	(I need a cheque)
Pollution control	Maury Missions	(More emissions)
Purchasing	Lois Bidder	(Lowest bidder)
Statistician	Marge Innovera	(Margin of error)
Russian chauffeur	Picov Andropov	(Pick up and drop off)
Legal firm	Dewey, Cheethum and Howe	(Do we cheat them and how)

In order to make sense of and find humour in such plays on words, you would have to have knowledge of English words.

The fact that the same sound sequences (*Lois Bidder – lowest bidder*) can be interpreted differently shows that the relation between sound and meaning is an arbitrary pairing, as discussed in Chapter 1. For example, *Un petit d'un petit* in French means 'a little one of a little one', but to an English speaker the sounds resemble the name *Humpty Dumpty*.

When you know a word, you know its sound (pronunciation) and its meaning. Because the sound–meaning relation is arbitrary, it is possible to have words with the same sound and different meanings (*bear* and *bare*), and words with the same meaning and different sounds (*sofa* and *couch*).

Because each word is a sound–meaning unit, each word stored in our mental lexicon must be listed with a meaning and with its unique phonological representation, which determines its pronunciation. For literate speakers, the spelling, or orthography, of most of the words we know is included.

Each word in your mental lexicon includes other information as well, such as whether it is a noun, a pronoun, a verb, an adjective, an adverb, a preposition or a conjunction. That is, the mental lexicon also specifies the *grammatical category* or *syntactic class* of the word. We will see in Chapter 5 that syntactic categories (traditionally known as 'parts of speech') are identified on the basis of distributional criteria. We can often tell the syntactic category of a word by looking at the affixes it combines with and its position in a phrase or sentence. For example, we know that the word *walk* is a verb because it can be inflected for the past tense, as in *walked*. Other parts of speech cannot be inflected for tense in English. Note, however, that in languages like English, the same word can belong to different parts of speech depending on context. For example, the word *walk* is functioning as a noun in *a walk* or *a strenuous walk* because nouns, but not verbs, are able to be modified by articles (*a*, *the*) and adjectives. That is why distributional criteria are so important in distinguishing between different parts of speech.

You may not consciously know that a form such as *love* is listed as both a verb and a noun, but a speaker has such knowledge, as shown by the phrases '*I love you*' and '*you are the love of my life*'. If such information were not in the mental lexicon, we would not know how to form grammatical sentences, nor would we be able to distinguish grammatical from ungrammatical sentences.

Content words and function words

> 'and even … the patriotic archbishop of Canterbury found it advisable—' 'Found what?' said the Duck. 'Found it', the Mouse replied rather crossly; 'of course you know what "it" means.' 'I know what "it" means well enough, when I find a thing', said the Duck; 'it's generally a frog or a worm. The question is, what did the archbishop find?'
>
> Lewis Carroll, *Alice's Adventures in Wonderland*, 1865

content word
Nouns, verbs, adjectives and adverbs; constitute a major part of the vocabulary.

open class
The class of lexical content words; a category of words to which new words are commonly added, such as nouns, verbs.

Languages make an important distinction between two kinds of words – content words and function words. Nouns, verbs, adjectives and adverbs are the **content words**. These words denote concepts such as objects, actions, attributes and ideas that we can think about, such as *children*, *anarchism*, *soar* and *purple*. Content words are sometimes called the **open-class** words because we can and regularly do add new words to these classes. A new word, *steganography*, which is the art of hiding information in electronic text, entered English with the internet revolution. Verbs such as *dis* have come into the language quite recently, as have nouns such as *blog* and adverbs such as *24/7*, pronounced 'twenty-four seven'. At the time of writing, some of the following words made it to the Macquarie Dictionary Word of the Year 2019 Shortlist:

- *anecdata* (noun), 'information which is presented as if it were based on systematic research, but is actually based on personal observation or experience. [blend of ANECDOTAL + DATA]'
- *hedonometer* (noun), 'an algorithm using language data to analyse levels of happiness, especially data from the social media platform Twitter'
- *robodebt* (noun), 'a debt owed to the government by a welfare recipient, arising from an overpayment of benefits calculated by an automated process which compares the recipient's income as stated by them to the government with their income as recorded by the Australian Taxation Office, a debt recovery notice being automatically generated and sent to the welfare recipient. Also, robo-debt. [ROBO + DEBT]'
- *thicc* (adjective), 'colloquial curvaceous; voluptuous. [originally African-American Vernacular English, early 2000s, a respelling of *thick*]'

Verbs such as *to decriminalise*, *to jackpot* and *to breathalyse* have been added to Australian English in recent years. New adverbs such as *weatherwise* and *saleswise* have also been added, as have adjectives such as *biodegradable*, *bottom-of-the-harbour* and *Claytons*.

Other classes of words do not have clear lexical meaning or obvious concepts associated with them, including conjunctions such as *and*, *or* and *but*; and the articles (determiners) *the* and *a/an*. These kinds of words are called **function words** because they specify grammatical relations and have little or no semantic content. Articles also referred to as 'determiners', for example, indicate whether a noun is definite or indefinite; for example, *the* boy or *a* boy. These are some examples of words whose function is purely grammatical – they are required by the rules of syntax.

function word
A word that does not have clear lexical meaning but has a grammatical function; function words include **conjunctions, determiners, auxiliaries** and **complementisers**.

closed class
A category, generally a **functional category**, that rarely has new words added to it, such as articles, conjunctions.

generic term
A word that applies to a whole class, such as *dog* in *the dog is found throughout the world*.

Function words are sometimes called **closed class** words. It is difficult to think of any new articles or conjunctions that have recently entered the language. The small set of personal pronouns such as *I*, *me*, *mine*, *he*, *she* and so on also belong to a closed class. With the growth of the feminist movement, some proposals have been made for adding a neutral singular pronoun that would be neither masculine nor feminine and that could be used as the general, or **generic**, form. If such a pronoun existed, it might have prevented the department chairperson in a large university from making this incongruous statement: 'We will hire the best person for the job regardless of his sex'. One proposal is to use *e*, pronounced like the letter name, but this is unlikely to happen because the closed classes are particularly unreceptive to new membership. Rather, speakers recruit already existing pronouns such as *they* and *their* for this job, as in 'Anyone can do it if *they* try hard enough', 'Everyone should do *their* best' or 'We will hire the best person for the job regardless of *their* sex'. A convenient ploy used by writers is s/he or she/he pronounced 'shee-hee' when read aloud, as in 'If any student wishes to leave early, *s/he* must obtain special permission'. Note that languages may vary in terms of which distinctions are distinctly marked in pronouns: person (first, second, third), number (singular, plural) and gender (masculine, feminine, neuter). Thus, while the form of the second person is identical in both the singular and plural in English (*you*), it has different forms in many other languages such as French.

The difference between content and function words is illustrated by the following test that has circulated over the internet:

Please count the number of Fs in the following text without reading further:

FINISHED FILES ARE THE
RESULT OF YEARS OF SCIENTIFIC
STUDY COMBINED WITH THE
EXPERIENCE OF YEARS.

If you are like most people, your answer will be three. That answer is wrong. The correct answer is six. Count again. This time pay attention to the word *of*.

This example illustrates that the brain treats content and closed class words differently. A great deal of psychological and neurological evidence supports this claim. The effect that we just illustrated with the *of* test is much more pronounced in brain-damaged people. As discussed in Chapter 2, some brain-damaged patients and people with specific language impairment have greater difficulty in using, understanding or reading closed class words. Some aphasics are unable to read words such as *in* or *which* but can read the content words *inn* and *witch*.

The two classes of words also seem to function differently in slips of the tongue produced by individuals without any language impairment. A speaker may, for example, inadvertently switch words to produce 'the journal of the editor' instead of 'the editor of the journal', but the switching or exchanging of closed class words has not been observed. There is also evidence for this distinction from language acquisition (discussed in Chapter 7). In the early stages of development, children often omit closed class words from their speech, for example, 'doggie barking'.

The linguistic evidence suggests that content words and function words play different roles in language. Content words bear the brunt of the meaning, whereas function words connect the content words to the larger grammatical context in ways that will be discussed later in this chapter and in subsequent chapters.

Morphemes: the minimal units of meaning

> 'They gave it me', Humpty Dumpty continued, 'for an un-birthday present.' 'I beg your pardon?' Alice said with a puzzled air. 'I'm not offended', said Humpty Dumpty. 'I mean, what is an un-birthday present?' 'A present given when it isn't your birthday, of course.'
>
> Lewis Carroll, *Through the Looking-Glass*, 1871

In the foregoing dialogue, Humpty Dumpty is well aware that the prefix *un-* means 'not', as further shown in the following pairs of words:

A	B
desirable	undesirable
likely	unlikely
inspired	uninspired
happy	unhappy
developed	undeveloped
sophisticated	unsophisticated

Thousands of English adjectives begin with *un-*. If we assume that the most basic unit of meaning is the word, what do we say about parts of words, such as *un-*, which have a fixed meaning? In all the words in column B above, *un-* means the same thing – 'not' – *undesirable* means 'not desirable', *unlikely* means 'not likely' and so on. All the words in column B consist of at least two meaningful units: *un* + *desirable*, *un* + *likely*, *un* + *inspired* and so on.

Just as *un-* occurs with the same meaning in the previous list of words, so does *phon-* in the following words. (You may not know the meaning of some of them, but you will by the time you finish this book.)

phone	phonology	phoneme
phonetic	phonologist	phonemic
phonetics	phonological	allophone
phonetician	telephone	euphonious
phonic	telephonic	symphony

Phon is a minimal form in that it cannot be decomposed. *Ph* does not mean anything; *pho*, though it may be pronounced like *foe*, has no relation in meaning to it; and *on* is not the preposition spelt *o-n*. In all the words on the list, *phon* has the identical meaning 'pertaining to sound'.

Words have internal structure, which is rule governed. *Uneaten*, *unadmired* and *ungrammatical* are words in English, but **eatenun*, **admiredun* and **grammaticalun* (to mean 'not eaten', 'not admired', 'not grammatical') are not, because we do not form a negative meaning of a word by **suffixing** *un* (i.e. by adding it to the end of the word) but by **prefixing** it (i.e. by adding it to the beginning).

suffix
An **affix** that is attached to the end of a **morpheme** or **stem**.

prefix
An **affix** that is attached to the beginning of a **morpheme** or **stem**.

morpheme
The smallest unit of linguistic meaning or function.

When Samuel Goldwyn, the pioneer filmmaker, announced, 'In two words: im-possible', he reflected the common view that words are the basic meaningful elements of a language. We have seen that this cannot be so since some words contain several distinct units of meaning. The linguistic term for the most elemental unit of grammatical form is **morpheme**. The word is derived from the Greek word *morphe*, meaning 'form'. If Goldwyn had taken a linguistics degree, he would have said, more correctly, 'In two morphemes: im-possible'.

A morpheme may be represented by a single sound, such as the morpheme *a*, meaning 'without' as in *amoral* or *asexual*, or by a single syllable, such as *child* and *ish* in *childish*. A morpheme may also consist of more than one syllable: two syllables, as in *camel*, *lady* and *water*; three syllables, as in *Hackensack* or *crocodile*; or four or more syllables, as in *hallucinate*, *apothecary* and *onomatopoeia*.

The study of the internal structure of words, and of the rules by which words are formed, is morphology. This word itself consists of two morphemes, *morph* + *ology*. The suffix *-ology* means 'science of' or 'branch of knowledge concerning'. Therefore, the meaning of *morphology* is 'the science of word forms'.

Morphology is part of our grammatical knowledge of a language. Like most linguistic knowledge, it is generally unconscious knowledge.

A single word may be composed of one or more morphemes:

one morpheme	boy desire
two morphemes	boy + ish desire + able
three morphemes	boy + ish + ness desire + able + ity
four morphemes	gentle + man + li + ness un + desire + able + ity
more than four	un + gentle + man + li + ness anti + dis + establish + ment + ari + an + ism[1]

A morpheme – the minimal linguistic unit – is therefore an arbitrary union of a sound and a meaning (or grammatical function) that cannot be further analysed. So solidly welded is this union in the mind that it is impossible for you to hear or read a word you know and not be aware of its meaning, even if you try! The combination of these two sides of the same coin is often called a **linguistic sign** (not to be confused with the signs of sign languages). Every word in every language is composed of one or more morphemes.

The discreteness of morphemes

Some people love to point out 'inconsistencies' in the English language. They observe that while singers *sing* and flingers *fling*, it is not the case that fingers *fing*. However, English speakers know that *finger* is a single morpheme, or a **monomorphemic word**. The final *-er* syllable in *finger* is not a separate morpheme because a finger is not 'something that fings'.

The meaning of a morpheme must be constant. The agentive morpheme *-er* means 'one who does' in words like *singer*, *painter*, *lover* and *worker*, but the same sounds represent the comparative morpheme meaning 'more' in *nicer*, *prettier* and *taller*. Therefore, two different morphemes may be pronounced identically. The identical form represents two morphemes because of the different meanings. The same sounds may occur in another word and not represent a separate morpheme at all, as in *finger*.

Conversely, the two morphemes *-er* and *-ster* have the same meaning, but different forms. Both *singer* and *songster* mean 'one who sings'. And like *-er*, *-ster* is not a morpheme in *monster* because a monster is not something that 'mons' or someone that 'is mon' the way *youngster* is someone who is young. All of this follows from the concept of the morpheme as a sound plus a meaning unit.

The decomposition of words into morphemes illustrates one of the fundamental properties of human language – discreteness. In all languages, discrete linguistic units combine in rule-governed ways to form larger units. Sound units combine to form morphemes, morphemes combine to form words, and words combine to form larger units – phrases and sentences. Discreteness is an important part of linguistic creativity.

We can combine morphemes in novel ways to create new words whose meaning will be apparent to other speakers of the language. If you know that 'to write' to a disc or a DVD means to put information on it, you automatically understand that a *writable* DVD is one that can take information, a *rewritable* DVD is one on which the original information can be written over, and an *unrewritable* DVD is one that does not allow the user to write over the original information. You know the meanings of all these words by virtue of your knowledge of the individual morphemes *write*, *re-*, *-able* and *un-*, and the rules for their combination.

Bound and free morphemes

Our morphological knowledge has two components: knowledge of the individual morphemes and knowledge of the rules that combine them. One of the things we know about particular morphemes is whether they can stand alone or whether they must be attached to a base morpheme.

Some morphemes, such as *boy*, *desire*, *gentle* and *man*, may constitute words by themselves. These are **free morphemes**. Other morphemes, such as *-ish*, *-ness*, *-ly*, *dis-*, *trans-* and *un-*, are never words by themselves but are always parts of words. These **affixes** are **bound morphemes** and they may attach at the beginning, the end or the middle of a word, or both at the beginning and the end.

Prefixes and suffixes

We know whether an affix precedes or follows other morphemes; for example, that *un-*, *pre-* (*premeditate*, *prejudge*) and *bi-* (*bipolar*, *bisexual*) are prefixes. They occur before other morphemes. Some morphemes occur only as suffixes, following other morphemes. English examples of suffix morphemes are *-ing* (e.g. *sleeping*, *eating*, *running*, *climbing*), *-er* (e.g. *singer*, *performer*, *reader* and *beautifier*), *-ist* (e.g. *typist*, *copyist*, *pianist*, *novelist*, *collaborationist* and *linguist*) and *-ly* (e.g. *manly*, *sickly*, *spectacularly* and *friendly*), to mention only a few.

linguistic sign
A sound or gesture, typically a **morpheme** in spoken languages and a **sign** in **sign languages**, that has a form bound to a meaning in a single unit.

monomorphemic word
A word that consists of one **morpheme**.

free morpheme
A single **morpheme** that constitutes a word.

affix
A bound morpheme attached to a stem or root; see **prefix**, **suffix**, **infix**, **circumfix**, **stem**, **root**.

bound morpheme
A morpheme that must be attached to other morphemes, such as *-ly*, *-ed*, *non-*; they are **prefixes**, **suffixes**, **infixes**, **circumfixes** and some **roots**; see also **free morpheme**.

Morphemes are the minimal linguistic signs in all languages, and many languages have prefixes and suffixes, but languages may differ in how they deploy these morphemes. A morpheme that is a prefix in one language may be a suffix in another and vice versa. In English, the plural morpheme *-s* is a suffix (e.g. *boys*, *machines*, *DVDs*). In Isthmus Zapotec, spoken in Mexico, the plural morpheme *ka-* is a prefix, as in the following examples:

zigi	chin	ka + zigi	chins
zike	shoulder	ka + zike	shoulders
diaga	ear	ka + diaga	ears

Languages may also differ in the meanings they express through affixation. In English we have the verb *dance*, as in '*I like to dance*', and we have the noun *dance*, as in '*The salsa is a Latin dance*'. The form is the same in both cases. In Turkish, you derive a noun from a verb with the suffix *-ak*, as in the following examples:

dur	to stop	dur + ak	stopping place
bat	to sink	bat + ak	sinking place or marsh/swamp

To express reciprocal action in English, we use the phrase *each other*, as in *understand each other*, *love each other*. In Turkish a morpheme is added to the verb:

anla	understand	anla + sh	understand each other
sev	love	sev + ish	love each other

The reciprocal suffix in these examples is pronounced as 'sh' after a vowel and as 'ish' after a consonant. This is similar to the process in English in which we use *a* as the indefinite article morpheme before a noun beginning with a consonant, as in *a dog*, and *an* before a noun beginning with a vowel, as in *an apple*. For discussion on the various pronunciations of morphemes see Chapter 3.

In Piro, an Arawakan language spoken in Peru, a single morpheme, *kaka*, can be added to a verb to express the meaning 'cause to':

cokoruha	to harpoon	cokoruha + kaka	cause to harpoon
salwa	to visit	salwa + kaka	cause to visit

In Karuk, a Native American language spoken in the Pacific Northwest, adding *-ak* to a noun forms the locative adverbial meaning 'in':

ikrivaam	house	ikrivaam + ak	in a house

It is accidental that both Turkish and Karuk have a suffix *-ak*. Despite the similarity in form, the two meanings are different. Similarly, the reciprocal suffix *-ish* in Turkish is similar in form to the English suffix *-ish*, as in *greenish*. Also in Karuk, the suffix *-ara* has the same meaning as the English *-y*; that is, 'characterised by' (*hairy* means 'characterised by hair').

aptiik	branch	aptik + ara	branchy

These examples illustrate again the arbitrary nature of the linguistic sign, that is, of the sound–meaning relationship, as well as the distinction between bound and free morphemes.

infix
A **bound morpheme** that is inserted in the middle of a word or **stem**.

Infixes

Some languages also have **infixes**, morphemes that are inserted into other morphemes. Bontoc, spoken in the Philippines, is such a language, as illustrated by the following:

Nouns/adjectives		Verbs	
fikas	strong	fumikas	to be strong
kilad	red	kumilad	to be red
fusul	enemy	fumusul	to be an enemy

In this language, the infix *-um-* is inserted after the first consonant of the noun or adjective. Therefore, a speaker of Bontoc who learns that *pusi* means 'poor' would understand the meaning of *pumusi*, 'to be poor', on hearing the word for the first time, just as an English speaker who learns the verb *sneet* would know that *sneeter* is 'one who sneets'. A Bontoc speaker who knows that *ngumitad* means 'to be dark' would know that the adjective 'dark' must be *ngitad*.

Oddly enough, the only infixes in English are full-word obscenities, usually inserted into adjectives or adverbs. A most common infix in Australia is the word *fuckin'* (and all the euphemisms for it, such as *friggin'*, *freakin'* and *flippin'*) as in *ri-fuckin'-diculous*. Another common infix is *bloody* and its euphemisms, such as *bloomin'*. In the movie and stage musical *My Fair Lady* (see **Figure 4.1**), the infix *abso* + *bloomin'* + *lutely* occurs in one of the songs sung by Eliza Doolittle.

Figure 4.1 **My Fair Lady**

Alamy Stock Photo/AF archive

Circumfixes

Some languages have **circumfixes** – morphemes that are attached to a base morpheme both initially and finally. These are sometimes called discontinuous morphemes. In Chickasaw, a Native American language spoken in Oklahoma, the negative is formed with both the prefix *ik-* and the suffix *-o*. The final vowel of the affirmative is dropped before the negative suffix is added. Examples of this circumfixing include:

circumfix
A bound morpheme, parts of which occur in a word both before and after the **root**.

Affirmative		Negative	
chokma	he is good	ik + chokm + o	he isn't good
lakna	it is yellow	ik + lakn + o	it isn't yellow
palli	it is hot	ik + pall + o	it isn't hot
tiwwi	he opens (it)	ik + tiww + o	he doesn't open (it)

participle
The form of a verb that occurs after the **auxiliary verbs** (see Chapter 5) *be* and *have*.

An example of a more familiar circumfixing language is German. The past **participle** of regular verbs is formed by adding the prefix ge- and the suffix -t to the verb root. This circumfix added to the verb root lieb, 'love', produces geliebt, 'loved' (or 'beloved' when used as an adjective).

Roots and stems

root
The **morpheme** that remains when all **affixes** are stripped from a complex word.

Morphologically complex words consist of a morpheme **root** and one or more affixes. Some examples of English roots are *paint* in *painter*, *read* in *re-read*, *ceive* in *conceive* and *ling* in *linguist*. A root may or may not stand alone as a word (*paint* and *read* do but *ceive* and *ling* do not). In languages that have circumfixes, the root is the form around which the circumfix attaches; for example, the Chickasaw root *chokm* in *ik-chokm-o*, meaning 'he isn't good'. In infixing languages the root is the form into which the infix is inserted, for example, *fikas* in the Bontoc word *f-um-ikas*, 'to be strong'.

Semitic languages, such as Hebrew and Arabic, have a unique morphological system. In these languages nouns and verbs are built on a foundation of three consonants, and one derives related words by varying the pattern of vowels and syllables. The root for 'write' in Egyptian Arabic, for example, is *ktb*, from which the following words (among others) are formed by infixing vowels:

katab	he wrote
katib	writer
kitáab	book
kútub	books

stem
The base to which one or more **affixes** are attached to create a more complex form that may be another stem or a word; see also **root**, **affix**.

When a root morpheme is combined with an affix, it forms a **stem**, which may or may not be a word (e.g. *painter* is both a word and a stem; *ceive* + *er* is only a stem). Other affixes can be added to a stem to form a more complex stem, as shown in the following:

root	Chomsky	(proper) noun
stem	Chomsky + ite	noun + suffix
word	Chomsky + ite + s	noun + suffix + suffix
root	believe	verb
stem	believe + able	verb + suffix
word	un + believe + able	prefix + verb + suffix
root	system	noun
stem	system + atic	noun + suffix
stem	un + system + atic	prefix + noun + suffix
stem	un + system + atic + al	prefix + noun + suffix + suffix
word	un + system + atic + al + ly	prefix + noun + suffix + suffix + suffix

With the addition of each new affix, a new stem and a new word are formed. Linguists sometimes use the word 'base' to mean any root or stem to which an affix is attached. In the preceding example, *system*, *systematic*, *unsystematic* and *unsystematical* would all be considered bases.

Bound roots

> It had been a rough day, so when I walked into the party I was very chalant, despite my efforts to appear gruntled and consolate. I was furling my wieldy umbrella … when I saw her … She was a descript person … Her hair was kempt, her clothing shevelled, and she moved in a gainly way.
>
> Jack Winter, 'How I Met My Wife', The New Yorker, 25 July 1994.

Bound roots do not occur in isolation and they acquire meaning only in combination with other morphemes. For example, words of Latin origin, such as *receive*, *conceive*, *perceive* and *deceive*, share a common root, *ceive*; and the words *remit*, *permit*, *commit*, *submit*, *transmit* and *admit* share the root *mit*. For the original Latin speakers, the morphemes corresponding to *ceive* and *mit* had clear meanings, but for modern English speakers, Latinate morphemes, such as *ceive* and *mit*, have no independent meanings. Their meanings depend on the entire words in which they occur.

A similar class of words is composed of a prefix affixed to a bound root morpheme. Examples are *ungainly*, but no **gainly*; *discern*, but no **cern*; *nonplussed*, but no **plussed*; *downhearted,* but no **hearted*; and others to be seen in this section's epigraph.

The morpheme *huckle*, when joined with *berry*, has the meaning of a berry that is small, round, and purplish blue; *luke* when combined with *warm* has the meaning 'somewhat' or 'moderately'. Both these morphemes and others like them (*cran*, *boysen*) are bound morphemes that convey meaning only in combination.

Rules of word formation

> 'I never heard of "Uglification"', Alice ventured to say. 'What is it?' The Gryphon lifted up both its paws in surprise. 'Never heard of uglifying!' it exclaimed. 'You know what to beautify is, I suppose?' 'Yes', said Alice doubtfully: 'it means – to make – anything – prettier.' 'Well, then', the Gryphon went on, 'if you don't know what to uglify is, you are a simpleton.'
>
> Lewis Carroll, *Alice's Adventures in Wonderland*, 1865

When the Mock Turtle listed the branches of Arithmetic for Alice as 'Ambition, Distraction, Uglification and Derision', Alice was very confused. In fact, *uglification* was not a common word in English until Lewis Carroll used it. Still, most English speakers would immediately know the meaning of *uglification* even if we had never heard or used the word before because we know the meaning of its individual parts: the root *ugly* and the affixes *-ify* and *-cation*.

We said earlier that knowledge of morphology includes knowledge of individual morphemes, their pronunciation and their meaning, and knowledge of the rules for combining morphemes into complex words. The Mock Turtle added *-ify* to the adjective *ugly* and formed a verb. Many verbs in English have been formed in this way: *purify*, *amplify*, *simplify*, *falsify*. The suffix *-ify* conjoined with nouns also forms verbs: *objectify*, *glorify*, *personify*. Notice that the Mock Turtle went even further: he added the suffix *-cation* to *uglify* and formed a noun, *uglification*, as in *glorification*, *simplification*, *falsification* and *purification*. By using the **morphological rules** of English he created a new word. The rules that he used are as follows:

Adjective + ify	→	Verb	to make adjective
Verb + cation	→	Noun	the process of making adjective

morphological rules
Rules for combining **morphemes** to form **stems** and words.

Derivational morphology

Bound morphemes, such as *-ify* and *-cation*, are called **derivational morphemes**. When they are added to a base, a new word with a new meaning is derived. The addition of *-ify* to *pure* – *purify* – means 'to make pure' and the further addition of *-cation* – *purification* – means 'the process of making pure'. If we invent an adjective, *pouzy*, to describe the effect of static electricity on hair, you will immediately understand the sentences 'Walking on that carpet really *pouzified* my hair' and 'The best method of *pouzification* is to rub a balloon on your head'. This means that we must have a list of the derivational morphemes in our mental dictionaries as well as the rules that

derivational morpheme
A morpheme added to a **stem** or **root** to form a new stem or word, possibly, but not necessarily, resulting in a change in **syntactic category**.

determine how they are added to a root or stem. The form that results from the addition of a derivational morpheme is called a **derived word**.

derived word
The form that results from the addition of a derivational morpheme.

Derivational morphemes have clear semantic content. In this sense they are like content words, except that they are not words. As we have seen, when a derivational morpheme is added to a base, it adds meaning. The derived word may also be of a different grammatical class than the original word, as shown by suffixes such as *-able* and *-ly*. When a verb is suffixed with *-able*, the result is an adjective, as in *desire* + *able*, *adore* + *able*. When the suffix *-en* is added to an adjective, a verb is derived, as in *dark* + *en*. One may form a noun from an adjective, as in *sweet* + *ie*. Other examples include:

Noun to adjective	Verb to noun	Adjective to adverb
boy + ish	acquit + (t)al	exact + ly
virtu + ous	clear + ance	
Elizabeth + an	accus + ation	
pictur + esque	confer + ence	
affection + ate	sing + er	
health + ful	conform + ist	
alcohol + ic	predict + ion	
Noun to verb	**Adjective to noun**	**Verb to adjective**
moral + ise	tall + ness	read + able
vaccin + ate	specific + ity	creat + ive
im + prison	feudal + ism	migrat + ory
haste + n	abstract + ion	run + (n)y
en + joy		
in + habit		
Adjective to verb		
en + large		
en + rich		

Some derivational affixes do not cause a change in grammatical class:

Noun to noun	Verb to verb	Adjective to adjective
friend + ship	un + do	pink + ish
human + ity	re + cover	in + flammable

Many prefixes fall into this category:

a + moral	mono + theism
auto + biography	re + print
ex + wife	semi + annual
super + human	

There are also suffixes of this type:

vicar + age	Brisbane + ite
old + ish	fad(d) + ist
Paul + ine	music + ian
America + n	pun + ster
veget + arian	humanit + arian

When a new word enters the lexicon by the application of morphological rules, other complex derivations may be **blocked**. For example, when *commun* + *ist* entered the language, words such as *commun* + *ite* (as in *Trotsky* + *ite*) or *commun* + *ian* (as in *grammar* + *ian*) were not needed; their formation was blocked. Sometimes, though, alternative forms do coexist; for example, *Chomskyan* and *Chomskyist* and perhaps even *Chomskyite* (all meaning 'follower of Chomsky's views of linguistics'). *Semanticist* and *semantician* are both used, but the possible word *semantite* is not.

blocked
A derivation that is prevented by a prior application of morphological rules.

Finally, derivational affixes appear to come in two classes. In one class, the addition of a suffix triggers subtle changes in pronunciation. When, for example, we affix *-ity* to *specific* (pronounced 'specifik' with a *k*-sound), we get *specificity* (pronounced 'specifisity' with an *s*-sound). When deriving *Elizabeth* + *an* from *Elizabeth*, the fourth vowel sound changes from the vowel in *Beth* to the vowel in *Pete*. Other suffixes, such as *-y*, *-ive* and *-ise*, may induce similar changes: *sane/sanity*, *deduce/deductive*, *critic/criticise*.

On the other hand, suffixes such as *-er*, *-ful*, *-ish*, *-less*, *-ly* and *-ness* may be tacked on to a base word without affecting the pronunciation, as in *baker*, *wishful*, *boyish*, *needless*, *sanely* and *fullness*. Moreover, affixes from the first class cannot be attached to a base containing an affix from the second class: **need* + *less* + *ity*, **moral* + *ise* + *ive*; but affixes from the second class may attach to bases with either kind of affix: *moral* + *is(e)* + *er*, *need* + *less* + *ness*.

Note that affixes occur in a particular order. Consider, for example, the word *denationalise* which has four morphemes: *de-nation-al-ise*. There are 24 mathematically possible orderings of these four morphemes (4! = 1 x 2 x 3 x 4 = 24), but only one order results in a possible word of English.

Inflectional morphology

Closed class words, such as *to*, *it* and *the*, are free morphemes. Many languages, including English, also have bound morphemes that have a strictly grammatical function. They mark properties, such as tense, number, gender, case and so forth. Such bound morphemes are called **inflectional morphemes**. Unlike derivational morphemes, they never change the syntactic category of the words or morphemes to which they are attached. Consider the forms of the verb in the following sentences:

inflectional morpheme
A bound **grammatical morpheme** that is affixed to a word according to rules of **syntax**.

1 I *sail* the ocean blue.
2 He *sails* the ocean blue.
3 John *sailed* the ocean blue.
4 John has *sailed* the ocean blue.
5 John is *sailing* the ocean blue.

In sentence (2) the *-s* at the end of the verb is an **agreement** marker; it signifies that the subject of the verb is third person and is singular, and that the verb is in the present tense. It does not add lexical meaning. The suffix *-ed* indicates past tense and is also required by the syntactic rules of the language when verbs are used with *have*, just as *-ing* is required when verbs are used with forms of *be*.

agreement
The process by which one word in a sentence is altered depending on a property of another word in that sentence, such as person, gender or number.

Inflectional morphemes represent relationships between different parts of a sentence. For example, *-s* expresses the relationship between the verb and the third-person singular subject; *-ed* expresses the relationship between the time the utterance is spoken (e.g. now) and the time of the event (e.g. past). If you say, 'John danced', the *-ed* affix places the activity before the utterance time. Inflectional morphology is closely connected to the syntax and semantics of the sentence.

English also has other inflectional endings, such as the plural suffix, which is attached to certain singular nouns, as in *boy/boys* and *cat/cats*. In contrast to Old and Middle English, which were more richly inflected languages (which we will discuss in Chapter 10), Modern English has only eight bound inflectional affixes:

English	Inflectional morphemes	Examples
-s	third-person singular present	She wait-**s** at home.
-ed	past tense	She wait-**ed** at home.
-ing	progressive	She is eat-**ing** the biscuit.
-en	past participle	Mary has eat-**en** the biscuit.
-s	plural	She ate the biscuit-**s**.
-'s	possessive	Disa-**'s** hair is short.
-er	comparative	Disa has short-**er** hair than Karin.
-est	superlative	Disa has the short-**est** hair.

Inflectional morphemes in English typically come after the derivational morphemes in a word. Therefore, to the derivationally complex word *commit* + *ment* one can add a plural ending to form *commit* + *ment* + *s*, but the order of affixes may not be reversed to derive the impossible *commit* + *s* + *ment* = **commitsment*.

Yet another distinction between inflectional and derivational morphemes is that inflectional morphemes are productive – they apply freely to nearly every appropriate base (except 'irregular' forms, such as *feet* not **foots*). Most nouns take an -*s* inflectional suffix to form a plural, but only some nouns take the derivational suffix -*ise* to form a verb; for example, *idolise*, but not **picturise*.

Compared to many languages of the world, English has relatively little inflectional morphology. Some languages are highly inflected. In Swahili, which is widely spoken in eastern and central Africa, verbs can be inflected with multiple morphemes as in *kimeanguka* (*ki* + *me* + *anguka*), meaning 'it has fallen'. Here the verb root *anguka*, meaning 'fall', has two inflectional prefixes: *ki*-, meaning 'it', and *me*, meaning 'completed action'.

Even the more familiar European languages have many more inflectional endings than English. In the Romance languages (languages descended from Latin; see **Figure 10.3** in Chapter 10), the verb has different inflectional endings, depending on the subject of the sentence. The verb is inflected to agree in person and number with the subject, as illustrated by the Italian verb *parlare*, meaning 'to speak':

Io parl**o**	I speak	Noi parl**iamo**	We speak
Tu parl**i**	You (singular) speak	Voi parl**ate**	You (plural) speak
Lui/Lei parl**a**	He/she speaks	Loro parl**ano**	They speak

case
A characteristic of nouns and pronouns, and in some languages articles and adjectives, determined by the function in the sentence, and generally indicated by the morphological form of the word.

case morphology
The process of **inflectional morphemes** combining with nouns to indicate the **grammatical relation** of the noun in its sentence.

Russian has a system of inflectional suffixes for nouns that indicates the noun's grammatical relation – whether a subject (nominative), direct object (accusative), indirect object (dative), possessor (genitive), and so on – something English does with word order or prepositions. Thus, consider the following examples (the č is pronounced like the *ch* in *cheese*; the š like the *sh* in *shoe*; the *j* like the *y* in *yet*):

Russian	Case	Translation
Drug čitaet	Nominative	A **friend** is reading
Ja vstretil drug**a**	Accusative	I met a **friend**
Ja dala èto drug**u**	Dative	I gave it **to a friend**
Bereg rek**i**	Genitive	The bank **of the river**
Ja pišu karandaš**om**	Instrumental	I write **with a pencil**
Cvety stojat na stol**e**	Prepositional	The flowers are **on the table**

The grammatical relation of a noun in a sentence is called the **case** of the noun. When case is marked by inflectional morphemes, the process is referred to as **case morphology**. Russian has a rich case morphology, whereas English case morphology is limited to the one possessive -*s* and its system of pronouns: *I-me-my-mine, you-you-your-yours, he-him-his-his, she-her-her-hers, they-them-their-theirs, we-us-our-ours*. Many of the grammatical relations that Russian expresses with its case morphology are expressed in English with prepositions, as the translation to English indicates.

Among the world's languages is a richness and variety of inflectional processes. Earlier we saw how German uses circumfixes to inflect a verb stem to produce a past particle: *lieb* to *geliebt*, similar to the *-ed* ending of English. Arabic infixes vowels for inflectional purposes: *kitáab*, 'book', but *kútub*, 'books'. Samoan (see exercise 9 in the end-of-chapter material) uses a process of **reduplication** – inflecting a word through the repetition of part or all of the word; for example, *savali* for 'he travels', but *savavali* for 'they travel'. Malay does the same with whole words: *orang* for 'person', but *orang orang* for 'people'. Languages such as Finnish have an extraordinarily complex case morphology, whereas Mandarin Chinese lacks case morphology entirely.

reduplication
A morphological process that repeats or copies all or part of a word to produce a new word.

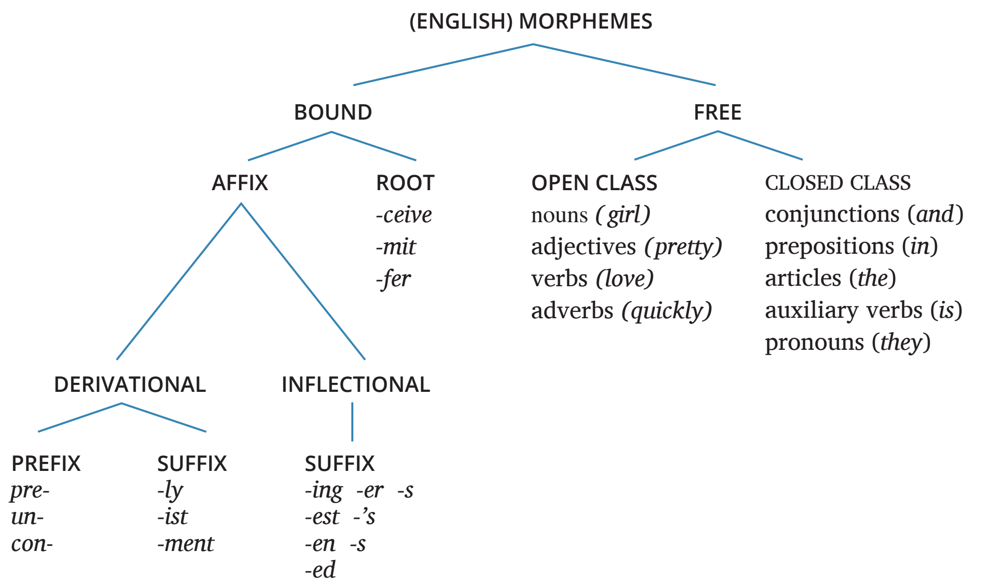
Inflection achieves a variety of purposes. In English, verbs are inflected with *-s* to show third-person singular agreement. Languages like Finnish and Japanese have a dazzling array of inflectional processes for conveying everything from 'temporary state of being' (Finnish nouns) to 'strong negative intention' (Japanese verbs). English spoken 1000 years ago had considerably more inflectional morphology than Modern English, as we shall discuss in Chapter 10.

Table 4.1 and Figure 4.2 summarise the differences between inflectional and derivational morphemes in Modern English.

Table 4.1 Differences between inflectional and derivational morphemes in Modern English

Inflectional	Derivational
Grammatical function	Lexical function
No word-class change	May cause word-class change
Small or no meaning change	Some meaning change
Often required by rules of grammar	Never required by rules of grammar
Follow derivational morphemes in a word	Precede inflectional morphemes in a word
Productive	Some productive, many non-productive

Figure 4.2 Classification of English morphemes



Note, however, that while it is true to say that derivational morphology causes word-class change, it is not applicable all the time. Thus, in English the derivational prefix *un-* does not change the word class (part of speech) of the word it attaches to: *happy* (adjective) > *unhappy* (adjective).

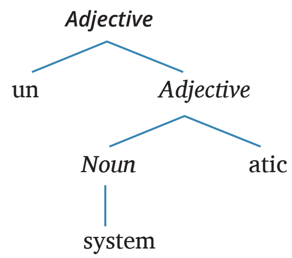
The hierarchical structure of words

We saw earlier that morphemes are added in a fixed order. This order reflects the **hierarchical structure** of the word. A word is not a simple sequence of morphemes. It has an internal structure. The word *unsystematic*, for example, is composed of three morphemes, *un-*, *system* and *-atic*. The root is *system*, a noun, to which we add the suffix *-atic*, resulting in an adjective, *systematic*. To this adjective we add the prefix *un-*, forming a new adjective, *unsystematic*.

hierarchical structure
The groupings and subgroupings of the parts of a sentence into **syntactic categories**; the groupings and subgroupings of morphemes in a word; hierarchical structure is generally depicted in a **tree diagram.**

tree diagram
A graphical representation of the linear and hierarchical structure of a word, phrase or sentence.

In order to represent the hierarchical organisation of words (and sentences), linguists use **tree diagrams**. The tree diagram for *unsystematic* is as follows:



This tree represents the application of two morphological rules:

1	Noun + *atic*	→	Adjective
2	*Un* + Adjective	→	Adjective

Rule 1 attaches the derivational suffix *-atic* to the root noun, forming an adjective. Rule 2 takes the adjective formed by rule 1 and attaches the derivational prefix *un-*. The diagram shows that the entire word – *unsystematic* – is an adjective that is composed of an adjective – *systematic* – plus *un-*. The adjective is itself composed of a noun – *system* – plus the suffix *-atic*.

Hierarchical structure is an essential property of human language. Words (and sentences) have component parts, which relate to each other in specific, rule-governed ways. Although at first glance it may seem that, aside from order, the morphemes *un-* and *-atic* each relate to the root *system* in the same way, this is not the case. The root *system* is 'closer' to *-atic* than it is to *un-*, and *un-* is actually connected to the adjective *systematic* and not directly to *system*. Indeed, **unsystem* is not a word.

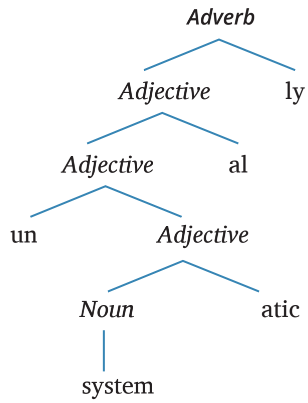
Further morphological rules can be applied to the structure given above; for example, English has a derivational suffix *-al*, as in *egotistical*, *fantastical* and *astronomical*. In these cases, *-al* is added to an adjective – *egotistic*, *fantastic*, *astronomic* – to form a new adjective. The rule for *-al* is as follows:

3	Adjective + *al* → Adjective

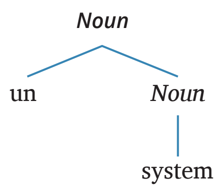
Another affix is *-ly*, which is added to adjectives – *happy*, *lazy*, *hopeful* – to form adverbs *happily*, *lazily*, *hopefully*. Following is the rule for *-ly*:

4	Adjective + *ly* → Adverb

Applying these two rules to the derived form *unsystematic*, we get the following tree for *unsystematically*:



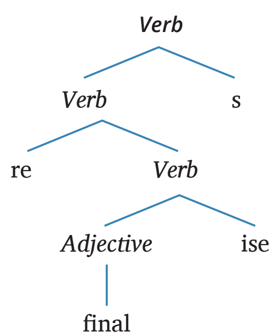
This is a rather complex word; however, it is well formed because it follows the morphological rules of the language. On the other hand, a very simple word can be ungrammatical. Suppose in the above example, we first added *un-* to the root *system*. That would have resulted in the non-word **unsystem*.



**Unsystem* is not a possible word because there is no rule of English that allows *un-* to be added to nouns. The large soft-drink company whose ad campaign promoted 'The Uncola' successfully flouted this linguistic rule to capture people's attention. Part of our linguistic competence includes the ability to recognise possible versus impossible words, like **unsystem* and **Uncola*. Possible words are those that conform to the rules of morphology (as well as of phonology; see Chapter 3); impossible words are those that do not.

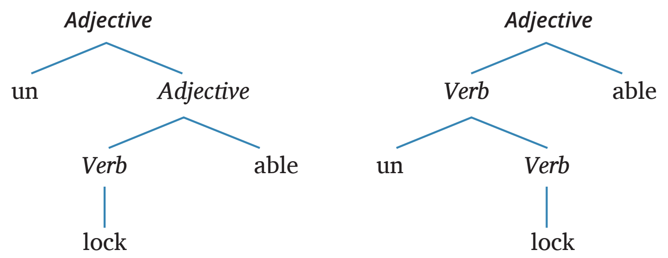
Tree diagrams make explicit the way speakers represent the internal structure of the morphologically complex words in their language. In speaking and writing, we appear to string morphemes together sequentially, as in *un* + *system* + *atic*. However, our mental representation of words is hierarchical as well as linear, and this is shown by tree diagrams.

Inflectional morphemes are equally well represented by tree diagrams. The following tree shows that the inflectional agreement morpheme *-s* follows the derivational morphemes *-ise* and *re-* in *refinalises*:



The tree also shows that *re-* applies to *finalise* (which is correct because **refinal* is not a word) and that the inflectional morpheme follows the derivational morpheme.

The hierarchical organisation of words is most clearly shown by structurally ambiguous words – words that have more than one meaning by virtue of having more than one structure. Consider the word *unlockable*. Imagine you are inside a room and you want some privacy. You would be unhappy to find the door is *unlockable* – 'not able to be locked'. Now imagine you are inside a locked room trying to get out. You would be very relieved to find the door is *unlockable* – 'able to be unlocked'. These two meanings correspond to two different structures, as follows:



In the first structure the verb *lock* combines with the suffix -*able* to form an adjective *lockable*, 'able to be locked'. Then the prefix *un*-, meaning 'not', combines with the derived adjective to form a new adjective *unlockable*, 'not able to be locked'. In the second case, the prefix *un*- combines with the verb *lock* to form a derived verb *unlock*. Then the derived verb combines with the suffix -*able* to form *unlockable*, 'able to be unlocked'.

An entire class of words in English follows this pattern: *unbuttonable*, *unzippable* and *unlatchable*, among others. The ambiguity arises because the prefix *un*- can combine with an adjective, as illustrated in rule (2) previously discussed, or it can combine with a verb, as in *undo*, *unstaple*, *unearth* and *unloosen*.

If words were only strings of morphemes without any internal organisation, we could not explain the ambiguity of words such as *unlockable*. These words also illustrate another important point, that structure is important to determining meaning. The same three morphemes occur in both versions of *unlockable*, yet there are two distinct meanings. The different meanings arise because of the two different structures.

Rule productivity

> 'Curiouser and curiouser!' cried Alice (she was so much surprised, that for the moment she quite forgot how to speak good English).
>
> Lewis Carroll, *Alice's Adventures in Wonderland*, 1865

productive
Refers to **morphological rules** that can be used freely and apply to all forms to create new words.

We have noted that some morphological processes, inflection in particular, are **productive**; meaning they can be used freely to form new words from the list of free and bound morphemes. The suffix -*able* appears to be a morpheme that can be conjoined with any verb to derive an adjective with the meaning of the verb and the meaning of -*able*, which is something like 'able to be', as in *accept* + *able*, *blam(e)* + *able*, *pass* + *able*, *change* + *able*, *breath(e)* + *able*, *adapt* + *able* and so on. The meaning of -*able* has also been given as 'fit for doing' or 'fit for being done'. The productivity of this rule is illustrated by the fact that we find -*able* affixed to new verbs such as *downloadable* and *twitterable*.

The prefix *un*- derives same-class words with an opposite meaning: *unafraid*, *unfit*, *un-Australian* and so on. Additionally, *un*- can be added to derived adjectives that have been formed by morphological rules, resulting in perfectly acceptable words such as *un* + *believe* + *able* or *un* + *pick* + *up* + *able*.

Yet *un*- is not fully productive. We find *happy* and *unhappy* but not *sad* and **unsad*, *brave* and **unbrave* or *obvious* and **unobvious*. The forms with asterisks that follow may be merely accidental gaps in the lexicon. If someone refers to a person as being **unsad* we would know that the person referred to was 'not sad' and an **unbrave* person would not be brave. But, as the linguist Sandra Thompson points out,[3] it may be the case that the '*un*-rule' is most productive for adjectives that are themselves derived from verbs, such as *unenlightened*, *unsimplified*, *uncharacterised*, *unauthorised*, *undistinguished* and so on. It also appears that most acceptable *un-* words have polysyllabic bases, and while we have *unfit*, *uncool* and *unclean*, many of the unacceptable *un*-forms have **monosyllabic** stems, such as **unbig*, **ungreat*, **unred*, **unsad*, **unsmall*, **untall*.

monosyllabic Having one syllable.

The rule that adds an *-er* to verbs in English to produce a noun meaning 'one who performs an action (once or habitually)' is a nearly productive morphological rule, giving us *examiner*, *exam-taker*, *analyser*, *lover*, *hunter* and *predictor* but fails full productivity owing to 'non-words' like **chairer*, which is not 'one who chairs'.

The 'other' *-er* suffix, the one that means 'more' as in *greedier*, also fails to be entirely productive as Alice's **curiouser* demonstrates. The more syllables a word has, the less likely *-er* will work and we will need the word *more*, as in *more beautiful* (not **beautifuler*) compared with the well-formed *nicer* or *prettier.*

Other derivational morphemes fall farther short of productivity. Consider:

sincerity	from	*sincere*
warmth	from	*warm*
moisten	from	*moist*

The suffix *-ity* is found in many other words in English, such as *chastity*, *scarcity* and *curiosity*; and *-th* occurs in *health*, *wealth*, *depth*, *width* and *growth*. We find *-en* in *sadden*, *ripen*, *redden*, *weaken* and *deepen*. Still, the phrase '*The fiercity of the lion' sounds somewhat strange, as does the sentence '*I'm going to thinnen the sauce'. Someone may use the word *coolth*, but when words such as *fiercity*, *thinnen*, *fullen* and *coolth* are used, usually it is either a slip of the tongue or an attempt at humour. Most adjectives will not accept any of these derivational suffixes.

Even less productive to the point of rareness are such derivational morphemes as the diminutive suffixes in the words *pig* + *let* and *sap* + *ling*.

In the morphologically complex words that we have seen so far, we can easily predict the meaning based on the meanings of the morphemes that make up the word. *Unhappy* means 'not happy' and *acceptable* means 'fit to be accepted'. However, one cannot always know the meaning of the words derived from free and derivational morphemes by knowing the morphemes themselves. The following *un-* forms have unpredictable meanings:

unloosen	loosen, let loose
unrip	rip, undo by ripping
undo	reverse doing
untread	go back through in the same steps
unearth	dig up
unfrock	deprive (a cleric) of ecclesiastic rank
unnerve	fluster

Morphologically complex words whose meanings are not predictable must be listed individually in our mental lexicons. However, the morphological rules must also be in the grammar, revealing the relations between words and providing the means for forming new words.

Exceptions and suppletions

> The exception gives Authority to the Rule.
>
> Giovanni Torriano, *A Common Place of Italian Proverbs*, 1666

The morphological rule that forms plurals from singular nouns does not apply to words such as *child*, *man*, *foot* and *mouse*. These words are exceptions to the rule. Similarly, verbs such as *go*, *sing*, *bring*, *run* and *know* are exceptions to the regular past tense rule in English.

When children are learning English, they first learn the regular rules, which they apply to all forms. Therefore, we often hear them say **mans* and **goed*. Later in the acquisition process, they specifically learn irregular plurals, such as *men* and *mice*, and irregular past tense forms such as *came* and *went*. These children's errors are actually evidence that the regular rules exist.

suppletive form

An inflected morpheme in which the regular rules do not apply.

Irregular, or **suppletive**, forms are treated separately in the grammar; that is, one cannot use the regular rules of inflectional morphology to add affixes to words that are exceptions, such as *child/children*, but must replace the non-inflected form with another word. It is possible that for regular words, only the singular form need be specifically stored in the lexicon because we can use the inflectional rules to form plurals. But this cannot be so with suppletive exceptions, and *children*, *mice*, and *feet* must be learnt separately. The same is true for suppletive past tense forms and comparative forms. There are regular rules – suffixes *-ed* and *-er* – to handle most cases, such as *walked* and *taller*, but words like *went* and *worse* need to be learnt individually as meaning '**goed*' and '**badder*'.

When a new word enters the language, the regular inflectional rules generally apply. The plural of *geek*, when it was a new word in English, was *geeks*, not **geeken*, although we are advised that some geeks wanted the plural of *fax* to be **faxen*, like *oxen*, when *fax* entered the language as a clip of *facsimile*. Never fear: its plural is *faxes*. The exception to this may be a loan word, a word borrowed from a foreign language; for example, the plural of Latin *datum* has always been *data*, never *datums*, though nowadays *data*, the one-time plural, is treated by many as a singular word like *information*.

The past tense of the verb *hit*, as in the sentence *Yesterday you hit the ball*, and the plural of the noun *sheep*, as in *The sheep are in the meadow*, show that some morphemes seem to have no phonological shape at all. We know that *hit* in the above sentence is *hit + past* because of the time adverb *yesterday*, and we know that *sheep* is the phonetic form of *sheep + plural* because of the plural verb form *are*.

When a verb is derived from a noun, even if it is pronounced the same way as an irregular verb, the regular rules apply to it. Therefore *ring*, when used in the sense of *encircle*, is derived from the noun *ring* and as a verb it is regular. We say, 'the police ringed the bank with armed men', not '*rang the bank with armed men'.

Lexical gaps

The vast majority of letter (sound) sequences that could be words of English – *clunt*, *spleek*, *flig* – are not. Similar comments apply to morphological derivations like *disobvious* or *inobvious*. 'Words' that conform to the rules of word formation but are not truly part of the vocabulary are **accidental gaps** (also called lexical gaps) in the lexicon. Accidental gaps are well-formed but non-existing words.

accidental gap

Phonological or morphological form that constitutes a possible but non-occurring lexical item.

The actual words in the language constitute only a subset of the possible words. Speakers of a language may know tens of thousands of words. Dictionaries, as we have noted, include hundreds of thousands of words, many of which are known by some speakers of the language. But no dictionary can list all **possible words** because it is possible to add to the vocabulary of a language in many ways. (Some of these will be discussed here and some in Chapter 10 on language change.) There are always gaps in the lexicon – words not present but which could be added. Some of the gaps are due to the fact that a permissible sound sequence has no meaning attached to it (e.g. *blick* or *slarm* or *krobe*). Note that the sequence of sounds must be in keeping with the constraints of the language. **Bnick* is not a 'gap' because no word in English can begin with *bn*. We discuss such constraints in Chapter 3.

possible word

A string of sounds that obeys the phonotactic constraints of the *language* but has no meaning.

Other gaps result when possible combinations of morphemes never come into use. Speakers can distinguish between impossible words, such as **unsystem* and **needlessity*, and possible, but non-existing, words such as *magnificenter* or *disobvious* (cf. *distrustful*). The latter are blocked, as noted earlier, owing to the presence of *more magnificent* and *non-obvious*. The ability to do this is further evidence that the morphological component of our mental grammar consists of not just a lexicon, a list of existing words, but also rules that enable us to create and understand new words, and to recognise possible and impossible words.

Compounds

> [T]he Houynhnms have no Word in their Language to express any thing that is evil, except what they borrow from the Deformities or ill Qualities of the Yahoos. Thus they denote the Folly of a Servant, an Omission of a Child, a Stone that cuts their feet, a Continuance of foul or unseasonable Weather, and the like, by adding to each the Epithet of Yahoo. For instance, Hnhm Yahoo, Whnaholm Yahoo, Ynlhmnawihlma Yahoo, and an ill contrived House, Ynholmhnmrohlnw Yahoo.
>
> Jonathan Swift, *Gulliver's Travels*, 1726

Two or more words may be joined to form new **compound** words. English is very flexible in the kinds of combinations permitted, as the following table of compounds shows:

compound
A word composed of two or more words, which may be written as a single word or as words separated by spaces or hyphens.

	Adjective	Noun	Verb
Adjective	bittersweet	poorhouse	whitewash
Noun	headstrong	homework	spoonfeed
Verb	feel-good	pickpocket	sleepwalk

Some compounds that have been recently introduced into English include *Facebook*, *LinkedIn*, *android apps*, *e-commerce*, *crowdfunding*, *cybercafé*, *flash mob*, and *robocall.*

In English, the rightmost word in a compound is the **head of the compound**. The head is the part of a word or phrase that determines its broad meaning and grammatical category. Such compounds are sometimes referred to by the term '**endocentric**', where one of the words of a compound functions as its head. The head of the compound *smartwatch* is *watch*, which determines the core meaning (e.g. *smartwatch* is a kind of *watch*), and syntactic category (e.g. *watch* is a noun so *smartwatch* is also a noun). The head of *sleepwalk* (a kind of walking) is *walk*, a verb, so *sleepwalk* is also a verb. If you go through these examples you will see that they mostly conform to this 'right-hand head rule' – but there are exceptions. Compounds whose rightmost member is a preposition are not themselves prepositions. A *meet-up* is a kind of meeting, not a direction, *meltdown* and *knockout* are nouns, not prepositions. This is further evidence that prepositions form a closed-class category that does not readily admit new members, in contrast to nouns, verbs and adjectives.

head (of a compound)
The rightmost word (in English).

endocentric compound
A compound with a head; one of the words in the compound functions as the head of the construction in determining its meaning and syntactic category.

Some compounds are said to be 'unheaded' (sometimes referred to as **exocentric compounds**) because the rightmost member does not determine their core meaning. An example is *flatfoot*, which is not a kind of *foot*, but a slang term meaning policeman. *Policeman* is also a compound, but unlike *flatfoot*, it is headed by *man*. A policeman is a kind of man. The head of a compound transmits not only its meaning and syntactic category to the compound but also whatever irregular morphological form it takes. The plural of *man* is the irregular form *men* and the plural of *policeman* is *policemen* (same for *policewomen*). But in the case of unheaded compounds, such as *flatfoot*, irregular morphology is not inherited by the compound – just as the meaning is not inherited. A *flatfoot* is not a kind of foot, and its plural is not *flatfeet*, but rather *flatfoots*. It undergoes the regular rule. Absent a head the compound transmits neither its meaning nor its irregular morphology. Similar examples are given below:

exocentric compound
A compound that lacks a head: none of the elements in the compound can function as the head of the construction.

walkman	*walkmen	walkmans	(device for playing music)
sabretooth	*sabreteeth	sabretooths	(extinct species of tiger)
lowlife	*lowlives	lowlifes	(a disreputable person)

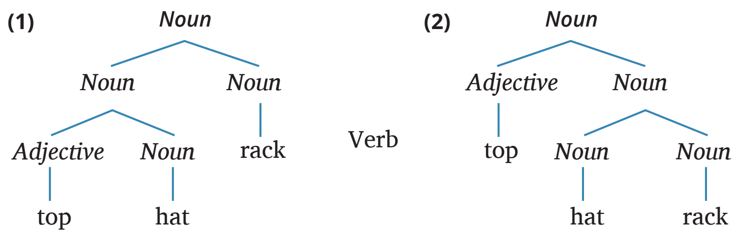
There are a few English compounds that appear to be left-headed. An *attorney-general* is not a general but an attorney, a *mother-in-law* is a kind of *mother*, and a *passer-by* is a person who passes. In these and similar cases the plural inflection occurs 'inside' the compound, on the head, *attorneys-general*, *passers-by*, *mothers-in-law*, *courts-martial* and *sergeants-major*. Many of these left-headed compounds are legal or military terms. They were borrowed into English from French – a language in which adjectives follow nouns – during the Norman occupation of England when French was used for legal, military and other affairs of state (see Chapter 10). It is fair to say, however, that for many people outside the military and legal professions these compounds behave like regular plurals, *attorney-generals, court-martials* and so on.

Although two-word compounds are the most common in English, it would be difficult to state an upper limit; consider *three-time loser*, *four-dimensional space–time*, *sergeant-at-arms*, *mother-of-pearl*, *man about town*, *master of ceremonies* and *daughter-in-law*. Dr Seuss uses the rules of compounding when he explains

> 'when tweetle beetles battle with paddles in a puddle, they call it a *tweetle beetle puddle paddle battle*'.[4]
>
> Fox in socks by Dr. Seuss. TM and © by Dr. Seuss Enterprises, LP, 1965, renewed 1993.

Spelling does not tell us what sequence of words constitutes a compound. Whether a compound is spelt with a space between the two words, with a hyphen or with no separation at all depends on the idiosyncrasies of the particular compound, as shown, for example, in *blackbird*, *blue-eye* and *smoke alarm*.

Like derived words, compounds have internal structure. This is clear from the ambiguity of a compound such as *top* + *hat* + *rack*, which can mean 'a rack for top hats', corresponding to the structure in tree diagram (1), or 'the highest hat rack', corresponding to the structure in (2).



Meaning of compounds

The head of a compound carries its core or basic meaning. *Homework* is a kind of work done at home. But the meaning of a compound is not always the sum of the meanings of its parts; for example, a *blackboard* may be green or white, an online newspaper is still a *newspaper* though no paper is involved, an albino goldfish would still be a *goldfish*, and a *rattlesnake*, though more stealthy, remains a rattlesnake even without its rattle.

Other compounds reveal other meaning relations between the parts, which are not entirely consistent because many compounds are idiomatic (idioms are discussed in Chapter 6). A *boathouse* is a house for boats, but a *cathouse* is not a house for cats (it is slang for a house of prostitution). A *jumping bean* is a bean that jumps, a *falling star* is a star that falls and a *magnifying glass* is a glass that magnifies; but a *looking glass* is not a glass that looks, nor is an *eating apple* an apple that eats, and *laughing gas* does not laugh. *Peanut oil* and *olive oil* are oils made from something, but what about *baby oil*? And is this a contradiction: horse meat is dog meat? Not at all, since the first is meat *from* horses and the other is meat *for* dogs.

In the examples so far, the meaning of each compound includes, at least to some extent, the meanings of the individual parts. However, many compounds do not seem to relate to the meanings of the individual parts at all. A *jack-in-a-box* is a tropical tree and a *turncoat* is a traitor. A *highbrow* does not necessarily have a high brow, nor does a *bigwig* have a big wig, nor does an *egghead* have an egg-shaped head.

Like certain words with the prefix *un-*, the meanings of many compounds must be learnt as if they were individual whole words. Some of the meanings may be figured out, but not all. If you had never heard the word *hunchback*, it might still be possible to infer the meaning, but if you had never heard the word *flatfoot*, it is doubtful you would know it means *detective* or *policeman*, even though the origin of the word, once you know the meaning, can be figured out.

The pronunciation of English compounds differs from the way we pronounce the sequence of two words that are not compounded. In an actual compound, the first word is usually stressed (pronounced somewhat louder and higher in pitch) and in a non-compound phrase, the second word is stressed. Thus we stress *hot* in *hotdog* but *dog* in *hot dog*. (Stress, pitch and other prosodic features are discussed in Chapters 2 and 3.)

Universality of compounding

Other languages have rules for conjoining words to form compounds, as seen by French *cure-dent*, 'toothpick'; German *Panzerkraftwagen*, 'armoured car'; Russian *cetyrexetaznyi*, 'four-storeyed'; and Spanish *tocadiscos*, 'record player'. In the Native American language Tohono O'odham, the word meaning 'thing' is *haichu* and it combines with *doakam*, 'living creatures', to form the compound *haichu doakam*, 'animal life'. In Twi, by combining the word meaning 'son' or 'child', *oba*, with the word meaning 'chief', *ohene*, one derives the compound *oheneba*, meaning 'prince'. By adding the word *of*, 'house', to *ohene*, the word meaning 'palace', *ahemfi*, is derived. The other changes that occur in the Twi compounds are due to phonological and morphological rules in the language. In Thai, the word 'cat' is *meew*, the word for 'watch' (in the sense of 'to watch over') is *fâw* and the word for 'house' is *bâan*. The word for 'watch cat' (like a watchdog) is the compound *mewfâwbâan* –literally 'catwatchhouse'.

Compounding is a common and frequent process for enlarging the vocabulary of all languages. There are other ways of forming new words, which will be discussed in Chapter 10 in the context of historical linguistics and language change. These include word coinage, deriving words from names, blending parts of existing words, shortening old words to form new ones, and the use of acronyms.

Word formation errors

The various kinds of affixation that we have discussed are by far the most common morphological processes among the world's languages. But, as we continue to emphasise in this book, the human language capacity is enormously creative, and that creativity extends to ways other than affixation that words may be altered and created.

As we will discuss below, backformations and malapropisms are errors in applying the rules of word formation that provide us with valuable insight into the structure of human language.

Back-formations

> [A girl] was delighted by her discovery that *eats* and *cats* were really *eat* + *-s* and *cat* + *-s*. She used her new suffix snipper to derive *mik (mix)*, *upstair*, *downstair*, *clo (clothes)*, *len (lens)*, *brefek* (from *brefeks*, her word for *breakfast*), *trappy* (*trapeze*), even *Santa Claw*.
>
> Steven Pinker, *Words and Rules: The Ingredients of Language*, 1999

Misconception can sometimes be creative, and nothing in this world both misconceives and creates like a child, as we shall see in Chapter 7. A new word may enter the language because of an incorrect morphological analysis. *Peddle*, for example, was derived from *peddler* on the mistaken assumption

back-formation
Creation of a new word by removing an **affix** from an old word, or by removing what is mistakenly considered an affix.

eponym
A word taken from a proper name, such as *Hertz* for 'unit of frequency'.

that the *-er* was the agentive suffix. Such words are called **back-formations**. The verbs *hawk*, *stoke*, *swindle* and *edit* all came into the language as back-formations – of *hawker*, *stoker*, *swindler* and *editor*. *Pea* was derived from a singular word, *pease*, by speakers who thought *pease* was a plural.

Some word creation comes from deliberately miscast back-formations. The word *bikini* is a monomorphemic **eponym** from the Bikini atoll of the Marshall Islands. Because the first syllable *bi* is a morpheme meaning 'two' in words such as *bicycle*, some clever person called a topless bathing suit a *monokini*. Historically, a number of new words have entered the English lexicon in this way. Based on analogy with such pairs as *act/action*, *exempt/exemption* and *revise/revision*, new words *resurrect*, *pre-empt* and *televise* were formed from the existing words *resurrection*, *pre-emption* and *television*.

Language purists sometimes rail against back-formations and cite *enthuse* and *liaise* (from *enthusiasm* and *liaison*) as examples of language corruption. However, language is not corrupted; it is adaptable and changeable. Do not be surprised to discover in your lifetime that *shevelled* and *chalant* have infiltrated the English language (from *dishevelled* and *nonchalant*) to mean 'tidy' and 'concerned', and if it happens do not cry havoc; all will be well.

Malapropisms

A *malapropism* is the confusion of a word through misinterpretation of its morphemes, usually with a humorous effect. Such 'mistakes' reveal much of the lexical knowledge of the speaker. Here are a few examples. Many more circulate on the internet.

Word	Humorous definition
abdicate	to give up all hope of ever having a flat stomach
adamant	pertaining to original sin
bibliography	holy geography
coffee	the person upon whom one coughs
deciduous	able to make up one's mind
diatribe	food for the whole clan
flabbergasted	appalled over how much weight you have gained
fortuitous	well protected
gubernatorial	to do with peanuts
gullible	to do with sea birds
homogeneous	devoted to home life
longevity	being very tall
metronome	a city dwelling diminutive troll
oxymoron	a really stupid cow
polyglot	more than one glot

The student who used the word *indefatigable* in the sentence:

She tried many reducing diets, but remained indefatigable.

clearly shows morphological knowledge; that is, *in* meaning 'not', as in *ineffective*, *de* meaning 'off', as in *decapitate*, *fat* as in 'fat', and *able* as in 'able', giving a combined meaning of 'not able to take the fat off'.

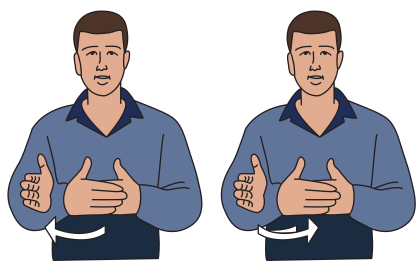
grammatical morpheme
A **closed class word** or **bound morpheme** required by the syntactic rules; see also **inflectional morpheme**.

Sign language morphology

Sign languages are rich in morphology. They have root and affix morphemes, free and bound morphemes, lexical content and **grammatical morphemes**, derivational and inflectional morphemes, and morphological rules for their combination to form morphologically complex signs.

Figure 4.3 illustrates the derivational process in Australian Sign Language (Auslan). Everything about the root morpheme remains the same except for the movement of the hands.

Figure 4.3 The derivation of a nominal from a verb in Auslan



Adapted from Johnston, T 2006, 'Sign language morphology', In K Brown (ed), *Encyclopedia of Language and Linguistics*, 2nd edition, Elsevier, pp. 324–328.

Inflections of sign roots also occur in Auslan, ASL and all other sign languages, which characteristically modify the movement of the hands and the spatial contours of the area near the body in which the signs are articulated.

Morphological analysis: identifying morphemes

As we have seen in this chapter, speakers of a language have knowledge of the internal structure of words because they know the morphemes of their language and the rules for their combination. This is unconscious knowledge, of course, and it takes a trained linguist to make this knowledge explicit as part of a descriptive grammar of the language. The task is challenging enough when the language you are analysing is your own, but linguists who speak one language may nevertheless analyse languages of which they are not native speakers.

Worked example

Suppose you were a linguist from the planet Zorx who wanted to analyse English. How would you discover the morphemes of English? How would you determine whether a word had one, two or more morphemes and what they were?

The first thing to do would be to ask native speakers how they say various words. (It would help to have a Zorxese–English interpreter along; if you cannot find one, copious gesturing is in order.) Assume you are talented in miming and manage to collect the following forms:

Adjective	Meaning
ugly	very unattractive
uglier	more ugly
ugliest	most ugly
pretty	nice looking
prettier	more nice looking
prettiest	most nice looking
tall	long in height
taller	more tall
tallest	most tall

To determine what the morphemes are in such a list, the first thing a field linguist would do is to see if some forms mean the same thing in different words; that is, to look for recurring forms. We find that *ugly* occurs in *ugly*, *uglier* and *ugliest*, all of which include the meaning 'very unattractive'. We also find that *-er* occurs in *prettier* and *taller*, adding the meaning 'more' to the adjectives to which it is attached. Similarly, *-est* adds the meaning 'most'. Furthermore, by asking additional questions of our English speaker we find that *-er* and *-est* do not occur in isolation with the meanings of 'more' and 'most'. We can therefore conclude that the following morphemes occur in English:

ugly	root morpheme
pretty	root morpheme
tall	root morpheme
er	bound morpheme 'comparative'
est	bound morpheme 'superlative'

As we proceed we find other words that end with *-er* (e.g. *singer*, *lover*, *bomber*, *writer*, *teacher*) in which the *-er* ending does not mean 'comparative' but, when attached to a verb, changes it to a noun who 'verbs' (e.g. *sings*, *loves*, *bombs*, *writes*, *teaches*). So we conclude that this is a different morpheme even though it is pronounced the same as the comparative. We go on and find words such as *number*, *umber*, *butter*, *member* and many others in which the *er* has no separate meaning at all – a *number* is not 'one who numbs' and a *member* does not 'memb' – and therefore these words are monomorphemic.

Once you have practised on the morphology of English, you might want to go on to describe another unfamiliar language.

Worked example

Paku was invented by a linguist for a 1970s TV series called *Land of the Lost*. In the show, this was the language used by the monkey people, called Pakuni. Suppose you found yourself in this strange land and attempted to find out what the morphemes of Paku were. Again, you would collect your data from a native Paku speaker and proceed as the Zorxese did with English. Consider the following data from Paku:

me	I	meni	we
ye	you (singular)	yeni	you (plural)
we	he	weni	they (masculine)
wa	she	wani	they (feminine)
abuma	girl	abumani	girls
adusa	boy	adusani	boys
abu	child	abuni	children
Paku	one Paku	Pakuni	more than one Paku

By examining these words you find that all the plural forms end in *-ni* and the singular forms do not. You therefore conclude that *-ni* is a separate morpheme meaning 'plural' that is attached as a suffix to a noun.

Here is a more challenging example, but the principles are the same.

Worked example

Look for repetitions and near repetitions of the same word parts, taking your cues from the meanings given. These are words from Michoacan Aztec, an indigenous language of Mexico:

nokali	my house	mopelo	your dog
nokalimes	my houses	mopelomes	your dogs
mokali	your house	ikwahmili	his cornfield
ikali	his house	nokwahmili	my cornfield
nopelo	my dog	mokwahmili	your cornfield

We see there are three base meanings: 'house', 'dog' and 'cornfield'. Starting with 'house' we look for commonalities in all the forms that refer to 'house'. They all contain *kali* so that makes a good first guess. (We might, and you might, have reasonably guessed *kal*, but eventually we would not know what to do with the *i* at the end of *nokali* and *mokali*.) With *kali* as 'house' we may infer that *no* is a prefix meaning 'my', and that is supported by *nopelo*, meaning 'my dog'. This being the case, we guess that *pelo* is 'dog' and see where that leads us. If *pelo* is 'dog' and *mopelo* is 'your dog', then *mo-* is probably the prefix for 'your'. Now that we think that the possessive pronouns are prefixes, we can look at *ikali* and deduce that *i-* means 'his'. If we are right about the prefixes, then we can separate out the word for 'cornfield' as *kwahmili*. The only morpheme unaccounted for is 'plural'. We have two instances of plurality, *nokalimes* and *mopelomes*, but since we know *no*, *kali*, *mo* and *pelo*, it is straightforward to identify the plural morpheme as the suffix *-mes*.

In summary of our analysis, then:

kali	house
pelo	dog
kwahmili	cornfield
no-	my
mo-	your
i-	his
-mes	plural

Here is a final example of morphological analysis complicated by some changes in spelling (pronunciation), a bit like the way we spell the indefinite article *a* as either *a* before a consonant or *an* before a vowel in English. Often the data you are given (or record in the field) are a hodgepodge, like these examples from a Slavic language:

Worked example

gledati	to watch	nazivaju	they call
diram	I touch	sviranje	playing (noun)
nazivanje	calling (noun)	gladujem	I starve
dirati	to touch	kupuju	they buy
kupovanje	buying (noun)	stanovati	to live

sviraju	they play	kupujem	I buy
gledam	I watch	diranje	touching (noun)
stanovanje	living (noun)	stanujem	I live
diraju	they touch	gladovanje	starving (noun)
nazivati	to call	stanuju	they live
kupovati	to buy	gledaju	they watch
gladuju	they starve	svirati	to play
gladovati	to starve	sviram	I play
gledanje	watching (noun)	nazivam	I call

The first step is often merely to rearrange the data, grouping commonalities.

Here we see that after (possibly considerable) perusal, the data involve seven stems, which we group by meaning. We also note that there are exactly four forms for each stem – infinitive, I (first person singular), they (third person plural), and the noun form or gerund – and we fold that into the reorganisation. We even alphabetise to emphasise the orderliness. Thus rearranged, the data appear less daunting:

	Touch	Starve	Watch	Buy	Call	Live	Play
Infinitive	dirati	gladovati	gledati	kupovati	nazivati	stanovati	svirati
1st, Sing.	diram	gladujem	gledam	kupujem	nazivam	stanujem	sviram
3rd, Plur.	diraju	gladuju	gledaju	kupuju	nazivaju	stanuju	sviraju
Noun	diranje	gladovanje	gledanje	kupovanje	nazivanje	stanovanje	sviranje

Now the patterns become more evident. We hypothesise that in the first column *dir-* is a stem meaning 'touch' and that the suffix *-ati* forms the infinitive; the suffix *-am* is the first-person singular; the suffix *-aju* is the third-person plural; and finally, the suffix *-anje* forms a noun, similar to the suffix *-ing* in English. We need to test our guess and the second column belies our hypothesis, but undaunted we push on and we see that the columns for 'watch', 'call', and 'play' work exactly like the column for 'touch', with stems *gled-*, *naziv-*, and *svir-*.

But columns 'starve', 'buy', and 'live' are not cooperating. They follow the pattern for the infinitive (first row) and noun formation (fourth row), and give us stems *gladov-*, *kupov-*, and *stanov-*, but something is awry in the second and third row for these three verbs. Instead of *-am* meaning 'I' it appears to be *-em*. (Yes, it could be *-ujem* or even *-jem*, but we stay with the form that is nearest to *-am*.) So the suffix meaning 'I' has two forms, *-am/-em*, again analogous to the English *a/an* alternation.

But – horrors – something is going haywire with the stems in just these three cases, and now our effort to rearrange the data pays off. We see fairly quickly that the misbehaving cases are all verbs ending in *ov*. And if we stick with our decision that *-am/-em* means 'I', then we can hypothesise that the stem alternates pronunciation in certain cases when it ends in *ov*, kind of like English *democrat/democracy*. If we accept this we are forced into the decision that the third-person plural morpheme also has an alternative form, namely *u*, so its two forms are *-aju/-u*.

We may sum up our analysis as follows:

> Stems *dir-*, *gled-*, *naziv-*, *svir-* take suffixes *-ati*, *-am*, *-aju*, *-anje*. The verbs ending in *ov* have stems *gladov-*, *kupov-*, *stanov-* when expressed as infinitives with *-ati* and noun forms with *-anje*; and stems *gladuj-*, *kupuj-*, *stanuj-* when expressed as 'I' with *-em* or as 'they' with *-u*.

Finally, if we discover in our field work, for example, that *razarati* means ‘to destroy’ then we immediately know that ‘I destroy’ is *razaram*, ‘they destroy’ is *razaraju*, and ‘destruction’ is *razaranje*. Or if we are told that *darujem* means ‘I gift’ then we deduce that the noun ‘gift’ is *darovanje*, the infinitive ‘to gift’ is *darovati*, and ‘they gift’ is *daruju*.

In Chapter 3 we discussed why the ‘same’ morpheme may be spelt or pronounced differently in different contexts, and that the variation, like most grammatical processes, is rule governed. By following the analytical principles discussed in the preceding four case studies you should be able to solve the morphological puzzles that appear in the exercises.

CHAPTER REVIEW

Summary

Knowing a language means knowing the morphemes of that language, which are the elemental units that comprise words. Therefore, *moralisers* is an English word composed of four morphemes: *moral* + *ise* + *er* + *s*. When you know a word or a morpheme, you know both its form (sound or sign) and its meaning; these are inseparable parts of the linguistic sign. The relationship between the form and meaning is arbitrary. There is no inherent connection between them (i.e. the words and morphemes of any language must be learnt).

Morphemes may be free or bound. *Free morphemes* stand alone like *girl* or *the* and they come in two types: *open class*, containing the content words of the language; and *closed class*, containing function words such as *the* or *if*. *Bound morphemes* may be affixes or bound roots, such as *-ceive*. Affixes may be prefixes, suffixes, circumfixes or infixes. Affixes may be derivational or inflectional. Derivational affixes often derive new words; inflectional affixes, such as the plural affix *-s*, make grammatical changes to words. Complex words contain a root around which stems are built by affixation. Rules of morphology determine what kind of affixation produces actual words (e.g. *un* + *system* + *atic*) and what kind produces non-words (e.g. **un* + *system*).

Words have hierarchical structure, as shown by ambiguous words such as *unlockable*, which may be *un* + *lockable*, 'unable to be locked', or *unlock* + *able*, 'able to be unlocked'.

Some morphological rules are productive, meaning they apply freely to the appropriate stem; for example, *re-* applies freely to verbal stems to give words like *redo*, *rewash* and *repaint*. Other rules are more constrained, forming words like *young* + *ster* but not **smart* + *ster*. Inflectional morphology is extremely productive – the plural *-s* applies freely even to nonsense words. Suppletive forms escape inflectional morphology, so instead of **mans* we have *men*; instead of **bringed* we have *brought*.

There are many ways for new words to be created other than affixation. Compounds are formed by uniting two or more root words in a single word, such as *homework*. The head of the compound (the rightmost word in English) bears the basic meaning, so *homework* means a kind of work done at home. However, often the meaning of compounds is not easily predictable and must be learnt as individual lexical items, such as *laughing gas*. Back-formations are words created by misinterpreting an affix look-alike such as *er* as an actual affix, so the verb *burgle* was formed under the mistaken assumption that *burglar* was *burgle* + *er*.

The grammars of sign languages also include a morphological component that has been analysed as consisting of a root, derivational and inflectional sign morphemes, and the rules for their combination.

Morphological analysis is the process of identifying form–meaning units in a language, taking into account small differences in pronunciation, so that *in-* and *im-* are seen to be the 'same' prefix in English (e.g. *intolerable*, *impeccable*) just as *democrat* and *democrac* are stem variants of the same morpheme, which shows up in *democratic* with its *t* and in *democracy* with its *c*.

Exercises

1 Here is how to estimate the number of words in your mental lexicon. Consult any standard dictionary.
   - a Count the number of entries on a typical page. They are usually bold-faced.
   - b Multiply the number of words per page by the number of pages in the dictionary.
   - c Pick four pages in the dictionary at random, say, pages 50, 75, 125 and 303. Count the number of words on these pages.
   - d How many of these words do you know?
   - e What percentage of the words on the four pages do you know?
   - f Multiply the words in the dictionary by the percentage you arrived at in (e). You know approximately that many English words.

2 Divide the following words by placing a + between their morphemes. (Some of the words may be monomorphemic and therefore indivisible.)

Example: replaces *re* + *place* + *s*			
a	befriended	n	airsickness
b	retroactive	o	bureaucrat
c	televise	p	democrat
d	margin	q	aristocrat
e	endearment	r	plutocrat
f	psychology	s	democracy
g	unpalatable	t	democratic
h	holiday	u	democratically
i	grandmother	v	democratisation
j	morphemic	w	democratise
k	mistreatment	x	democratiser
l	Wollongong	y	democratising
m	saltpetre	z	democratised

3 Match each expression under A with the one statement under B that characterises it.

A		B	
a	noisy crow	i	compound noun
b	scarecrow	ii	root morpheme plus derivational prefix
c	the crow	iii	phrase consisting of adjective plus noun
d	crowlike	iv	root morpheme plus inflectional affix
e	crows	v	root morpheme plus derivational suffix
		vi	grammatical morpheme followed by lexical morpheme

4 Match the italicised and underlined part of each word in list A with the one proper description from list B.

A		B	
a	terroris*ed*	i	free root
b	un*civil*ised	ii	bound root
c	terror*ise*	iii	inflectional suffix
d	*luke*warm	iv	derivational suffix
e	*im*possible	v	inflectional prefix
		vi	derivational prefix
		vii	inflectional infix
		viii	derivational infix

5 Sweden has given the world the rock group ABBA, the automobile Volvo and the great film director Ingmar Bergman. The Swedish language also offers us a noun morphology that you can analyse with the knowledge gained reading this chapter. Consider these Swedish noun forms:

en lampa	a lamp	en bil	a car
en stol	a chair	en soffa	a sofa
en matta	a carpet	en katt	a cat
lampor	lamps	bilar	cars
stolar	chairs	soffor	sofas
mattor	carpets	kattar	cats
lampan	the lamp	bilen	the car
stolen	the chair	soffan	the sofa

mattan	the carpet	katten	the cat
lamporna	the lamps	bilarna	the cars
stolarna	the chairs	sofforna	the sofas
mattorna	the carpets	kattarna	the cats

a What is the Swedish word for the indefinite article *a* (or *an*)?
b What are the two forms of the plural morpheme in these data? How can you tell which plural form applies?
c What are the two forms of the morpheme that make a singular word definite, that is, correspond to the English article *the*? How can you tell which form applies?
d What is the morpheme that makes a plural word definite?
e In what order do the various suffixes occur when there is more than one?
f If *en flicka* is 'a girl', what are the forms for 'girls', 'the girl' and 'the girls'?
g If *bussarna* is 'the buses', what are the forms for 'buses' and 'the bus'?

6 Here are some nouns from the Philippine language Cebuano.

sibwano	a Cebuano	binisaja	the Visayan language
ilokano	an Ilokano	ininglis	the English language
tagalog	a Tagalog person	tinagalog	the Tagalog language
inglis	an Englishman	inilokano	the Ilocano language
bisaja	a Visayan	sinibwano	the Cebuano language

a What is the exact rule for deriving language names from ethnic group names?
b What type of affixation is represented here?
c If *suwid* meant 'a Swede' and *italo* meant 'an Italian', what would be the words for the Swedish language and the Italian language?
d If *finuranso* meant 'the French language' and *inunagari* meant 'the Hungarian language', what would be the words for a Frenchman and a Hungarian?

7 The following infinitive and past participle verb forms are found in Dutch.

Root	Infinitive	Past participle	
wandel	wandelen	gewandeld	walk
duw	duwen	geduwd	push
stofzuig	stofzuigen	gestofzuigd	vacuum-clean

With reference to the morphological processes of prefixing, suffixing, infixing and circumfixing discussed in this chapter and the specific morphemes involved:
a State the morphological rule for forming an infinitive in Dutch.
b State the morphological rule for forming the Dutch past participle form.

8 Below are some sentences in Swahili:

mtoto	amefika	The child has arrived.
mtoto	anafika	The child is arriving.
mtoto	atafika	The child will arrive.
watoto	wamefika	The children have arrived.
watoto	wanafika	The children are arriving.
watoto	watafika	The children will arrive.
mtu	amelala	The person has slept.
mtu	analala	The person is sleeping.
mtu	atalala	The person will sleep.
watu	wamelala	The people have slept.

watu	wanalala	The people are sleeping.
watu	watalala	The people will sleep.
kisu	kimeanguka	The knife has fallen.
kisu	kinaanguka	The knife is falling.
kisu	kitaanguka	The knife will fall.
visu	vimeanguka	The knives have fallen.
visu	vinaanguka	The knives are falling.
visu	vitaanguka	The knives will fall.
kikapu	kimeanguka	The basket has fallen.
kikapu	kinaanguka	The basket is falling.
kikapu	kitaanguka	The basket will fall.
vikapu	vimeanguka	The baskets have fallen.
vikapu	vinaanguka	The baskets are falling.
vikapu	vitaanguka	The baskets will fall.

One of the characteristic features of Swahili (and Bantu languages in general) is the existence of noun classes. Specific singular and plural prefixes occur with the nouns in each class. These prefixes are also used for purposes of agreement between the subject noun and the verb. In the sentences given, two of these classes are included (there are many more in the language).

a Identify all the morphemes you can and give their meanings.

Example: *-toto* – 'child'

m – noun prefix attached to singular nouns of class I

a – prefix attached to verbs when the subject is a singular noun of class I

Be sure to look for the other noun and verb markers, including tense markers.

b How is the verb constructed; that is, what kinds of morphemes are strung together and in what order?

c How would you say the following in Swahili?

i The child is falling.

ii The baskets have arrived.

iii The person will fall.

9 One morphological process briefly discussed in this chapter is reduplication – the formation of new words through the repetition of part or all of a word – which occurs in many languages. The following examples from Samoan exemplify this kind of morphological rule.

manao	he wishes	mananao	they wish
matua	he is old	matutua	they are old
malosi	he is strong	malolosi	they are strong
punou	he bends	punonou	they bend
atamai	he is wise	atamamai	they are wise
savali	he travels	pepese	they sing
laga	he weaves		

a What is the Samoan word for each of the following?

i they weave

ii they travel

iii he sings.

b Formulate a general statement (a morphological rule) that states how to form the plural verb form from the singular verb form.

10 Below are listed some words followed by incorrect definitions. (All these errors are taken from Amsel Greene's *Pullet Surprises*.)

Word	Student definition
stalemate	husband or wife no longer interested
effusive	able to be merged
tenet	a group of ten singers
dermatology	a study of derms
ingenious	not very smart
finesse	a female fish

For each of these incorrect definitions, give some possible reasons why the students made the guesses they did. Where you can do so, exemplify by reference to other words or morphemes, giving their meanings.

11 a Draw tree diagrams for the following words: *construal*, *disappearances*, *irreplaceability*, *misconceive*, *indecipherable* and *redarken*.

b Draw two tree diagrams for *undarkenable* to reveal its two meanings: 'able to be less dark' and 'unable to be made dark'.

12 There are many asymmetries in English in which a root morpheme combined with a prefix constitutes a word, but without the prefix is a non-word. A number of these are given in this chapter.

a Below is a list of such non-word roots. Add a prefix to each root to form an existing English word.

Non-words
*descript
*cognito
*beknownst
*peccable
*promptu
*plussed
*domitable
*nomer

b There are many more such multimorphemic words for which the root morphemes do not constitute words by themselves. See how many you can think of.

13 We have seen that the meaning of a compound is often not revealed by the meaning of its composite words. Crossword puzzles and riddles often make use of this by providing the meaning of two parts of a compound and asking for the resulting word, for example, infielder + diminutive/cease. Read this as asking for a word that means 'infielder' by combining a word that means 'diminutive' with a word that means 'cease'. The answer is *shortstop*. See if you can figure out the following:

a sci-fi TV series = headliner/journey

b campaign = farm building/tempest

c at-home wear = tub of water/court attire

d kind of pen = formal dance/sharp end

e conservative = correct/part of an airplane.

14 Consider the following dialogue between a parent and a schoolchild:

Parent:	**When will you be done with your eight-page book report, dear?**
Child:	**I haven't started it yet.**
Parent:	**But it's due tomorrow, you should have begun weeks ago. Why do you always wait until the last minute?**
Child:	**I have more confidence in myself than you do.**
Parent:	**Excuse me?**
Child:	**I mean, how long could it possibly take to read an eight-page book?**

The humour is based on the ambiguity of the compound *eight-page book report*. Draw two tree diagrams similar to those in the text for *top hat rack* (see p. 138) to reveal the ambiguity.

15 One of the characteristics of Italian is that articles and adjectives have inflectional endings that mark agreement in gender (and number) with the noun they modify. Based on this information, answer the questions that follow this list of Italian phrases:

un uomo	a man
un uomo robusto	a robust man
un uomo robustissimo	a very robust man
una donna robusta	a robust woman
un vino rosso	a red wine
una faccia	a face
un vento secco	a dry wind

a What is the root morpheme meaning 'robust'?
b What is the morpheme meaning 'very'?
c What is the Italian word for the following?
  i a robust wine
  ii a very red face
  iii a very dry wine.

16 Below is a list of Turkish words. In Turkish, articles and morphemes indicating location are affixed to the noun.

deniz	an ocean	evden	from a house
denize	to an ocean	evimden	from my house
denizin	of an ocean	denizimde	in my ocean
eve	to a house	elde	in a hand

a What is the Turkish morpheme meaning 'to'?
b What kind of affixes in Turkish correspond to English prepositions (e.g. prefixes, suffixes, infixes, free morphemes)?
c What would the Turkish word for 'from an ocean' be?
d How many morphemes are there in the Turkish word *denizimde*?

17 The following are some verb forms in Chickasaw, a member of the Muskogean family of languages spoken in south-central Oklahoma.[5] Chickasaw is an endangered language. Currently, there are only about 100 speakers of Chickasaw, most of whom are more than 70 years old.

sachaaha	I am tall	chaaha	he or she is tall
chichaaha	you are tall	hoochaaha	they are tall
satikahbi	I am tired	chitikahbitok	you were tired
chichchokwa	you are cold	hopobatok	he was hungry
hoohopobatok	they were hungry	sahopoba	I am hungry

a What is the root morpheme for the following verbs?
   i to be tall
   ii to be hungry.
b What is the morpheme meaning each of the following?
   i past tense
   ii I
   iii you
   iv he or she.
c If the Chickasaw root for 'to be old' is *sipokni*, how would you say each of the following?
   i You are old
   ii He was old
   iii They are old

18 The language Little-End Egglish (whose source is revealed in exercise 19, Chapter 10), exhibits the following data:

a	kul 'omelette'	zkulego 'my omelette'	zkulivo 'your omelette'
b	vet 'yolk (of egg)'	zvetego 'my yolk'	zvetivo 'your yolk'
c	rok 'egg'	zrokego 'my egg'	zrokivo 'your egg'
d	ver 'eggshell'	zverego 'my eggshell'	zverivo 'your eggshell'
e	gup 'soufflé'	zgupego 'my soufflé'	zgupivo 'your soufflé'

   i Isolate the morphemes that indicate possession, first-person singular and second person (we do not know whether singular, plural or both). Indicate whether the affixes are prefixes or suffixes.
   ii Given that *vel* means 'egg white', how would a Little-End Egglisher say 'my egg white'?
   iii Given that *zpeivo* means 'your hard-boiled egg', what is the word meaning 'hard-boiled egg'?
   iv If you knew that *zvetgogo* meant 'our egg yolk', what would likely be the morpheme meaning 'our'?
   v If you knew that *borokego* meant 'for my egg', what would likely be the morpheme bearing the benefactive meaning 'for'?

19 Here are some data from the indigenous language Zoque spoken in Mexico. (The ʔ is a glottal stop.) (*Hint*: Rearrange the data as in the Slavic example at the end of the chapter.)

sohsu	he/it cooked	cicpa	he/it tears
witpa	he/it walks	kenu	he/it looked
sikpa	he/it laughs	cihcu	he/it tore
kaʔu	he/it died	sospa	he/it cooks
kenpa	he/it looks	wihtu	he/it walked
sihku	he/it laughed	kaʔpa	he/it dies

a What is the past-tense suffix?
b What is the present-tense suffix?
c This language has some verb stems that assume two forms. For each verb (or stem pair), give its meaning and form(s).
d What morphological environment determines which of any two possible forms occurs?

20 **Challenge exercise:** Consider what are called 'interfixes', such as *-o-* in English *jack-o-lantern*. They are said to be meaningless morphemes attached to two morphemes at once. What can you learn about that notion? Where do you think the *-o-* comes from? Are there languages other than English that have interfixes?

21 Consider the following data from Amharic, a language spoken in Ethiopia and answer the questions that follow:

təmariotʃtʃu	t'ərmus	səbbəru	'The students broke a bottle'
ɨzzih	təmariotʃtʃ	nəbbəru	'There were students here'
ɨsswa	jət	nəbbərətʃtʃ	'Where was she?'

təmariwa	t'ərmus	wəssədətʃtʃ	'The female student took a bottle'
təmariw	t'ərmus	səbbərə	'The male student broke a bottle'
t'ərmus	tɨlantɨna	təsəbbərə	'One/a bottle was broken yesterday'
ləmma	mɨn	wəssədə	'What did Lemma take?'
aləm	t'ərmus	səbbərətʃtʃ	'Alem broke a bottle'
təmariw	t'ərmus	alsəbbərəmm	'The male student didn't break a bottle'

a What is/are the morpheme(s) that mark(s) definiteness on nouns (that is, the morpheme corresponding to 'the' in English)?
b What is the morpheme that marks plurality in nouns?
c What is the verb stem for 'break'?
d What is the verb stem for 'take'
e What is the morpheme for marking the passive voice?
f Identify all the morphemes in the verb that correspond to the subject of the clause
g What is the morpheme that marks the negative ('not')?
h There are two proper names in the data. Identify their gender (masculine versus feminine) and provide evidence for your choice.

22 Provide the Amharic translations of the following sentences. All the morphemes you need for the translation can be extracted from the data in exercise (21) above.
a One/a bottle was taken yesterday.
b Where was Lemma?
c She did not break a bottle.

23 Consider the following data from the language Papuan Malay (Kluge, 2017) and identify all the derivational morphemes with their meanings.

ana	child	anaang	offspring
bayang	image	bayangang	shadow
doa	prayer	berdoa	pray
gisi	nutrient	bergisi	be nutritious
hasil	result	berhasil	succeed
laut	sea	lautang	ocean
singgung	offend	tersinggung	be offended
sodara	sibling	bersodara	be siblings
tukar	exchange	tertukar	get changed

24 Consider the following data from the language Sierra Popoluca (Elson & Pickett, 1964) and identify all the morphemes with their meanings.

a	anʌkpa	I am going
b	tanʌkpa	you and I are going
c	minʌkpa	you are going
d	nʌkpa	he is going

25 **Challenge exercise:** In the text, we discussed the morphological system of Semitic languages, such as Hebrew and Arabic. We noted that in these languages nouns and verbs are built on a foundation of three consonants (root), and one derives related words by varying the pattern of vowels and syllables. In the following data set from Amharic, there is a list of three consonantal roots and three patterns of vowels and syllables (template). Your task is to derive the correct form of each verb or noun using the three templates provided (perfective, imperfective, and verbal noun). The first one is done for you as an example:

	Perfective	Imperfective	Verbal noun
	$C_1əC_2C_2əC_3ə$	$jɨ\text{-}C_1əC_2C_3$	$mə\text{-}C_1C_2əC_3$
Example: sbr 'break'	*səbbərə*	*jɨ-səbr*	*mə-sbər*

a sbr 'break'
b wsd 'take'
c drs 'arrive'
d k'lt' 'melt'
e st'm 'sink'
f wrd 'descend'
g flt' 'split (wood)'

26 Consider the following data from Yagua, a language spoken in Peru, and identify all the morphemes and their meanings.[6]

a	tsanta	he plants
b	tsantʃa	he weaves
c	tsantarų́ųy	he wants to plant
d	tsantʃarų́ųymą́ą	he already wants to weave
e	ną́ąntʃatsí	she wove a week ago
f	tsantaháy	he planted yesterday
g	ną́ąntarų́ųyháymą́ą	she was already wanting to plant yesterday
h	tsantʃarų́ųytsímą́ą	he was already wanting to weave a week ago
i	ną́ąntʃaháy	she wove yesterday
j	ną́ąnta	she plants
k	tsatúnurų́ųy	he wants to tie together
l	ną́ątúnuháymą́ą	she already tied together yesterday
m	tsatúnurų́ųytsímą́ą	he was already wanting to tie together a week ago
n	tsatúnu	he ties together.

Further reading

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Weblinks

https://www.smg.surrey.ac.uk – Surrey Morphology Group (SMG) is a linguistics research centre dedicated to the study of language diversity and its theoretical consequences

https://wals.info – WALS is a large database of structural (phonological, grammatical, lexical) properties of languages gathered from descriptive materials (e.g. reference grammars).

http://www.australex.org – Here you will find dictionaries of all kinds, varieties of English spoken in Australia and New Zealand, Australian place names, etc.

http://martinweisser.org/corpora_site/CBLLinks.html – This website is another treasure trove of information about corpora and corpus-based linguistics, but chiefly for English.

http://www.macquariedictionary.com.au – This is the most up-to-date Australian dictionary online with annual updates of new words used in Australia.

http://www.merriam-webster.com – Lots of great stuff here including word definitions, history of words and of the English language, interactive vocabulary quizzes, and even a guide to international business communication.

Endnotes

1 Some speakers have even more morphemes in this word than are shown.

2 The full version of this piece appears in *The answer to everything*, a comic memoir by Jack Winter.

3 Thompson, S A 1975, 'On the issue of productivity in the lexikon', *Kritikon Litterarum*, *4*: 332–349.

4 From *Fox in socks* by Dr Seuss. TM and © by Dr Seuss Enterprises, LP, 1965, renewed 1993. Used by permission of Random House Children's Books, a division of Random House, Inc, International Creative Management and HarperCollins Publishers, Ltd, UK.

5 The Chickasaw examples are provided by Pamela Munro.

6 Data from Elson, B and Pickett, V 1964, *An Introduction to Morphology and Syntax*, Santa Ana, California: Summer Institute of Linguistics (p. 14). We have slightly modified some of the symbols/letters.

5 Syntax: the sentence patterns of language

To grammar even kings bow.

Molière, *Les Femmes Savantes*, II, 1672

Learning objectives

After reading Chapter 5, you should be able to:

- understand the arguments for our unconscious knowledge of syntactic properties
- identify the various syntactic categories using constituency tests and distributional criteria
- use the system of phrase structure rules to draw phrase structure trees for a range of English sentences
- relate syntactic structures through movement from one position to another in the hierarchical phrase structure
- explain the role of principles and parameters in the theory of Universal Grammar.

Any speaker of a human language can produce and understand an infinite number of sentences. We can show this quite easily through examples such as:

The kindhearted boy had many girlfriends.

The kindhearted, intelligent boy had many girlfriends.

The kindhearted, intelligent, handsome boy had many girlfriends.

John went to the movies.

John went to the movies and ate popcorn.

John went to the movies, ate popcorn and drank a lemonade.

The cat chased the mouse.

The cat chased the mouse that ate the cheese.

The cat chased the mouse that ate the cheese that came from the cow.

The cat chased the mouse that ate the cheese that came from the cow that grazed in the field.

In each case, the speaker could continue creating sentences by adding an adjective, or a noun connected by *and*, or a relative clause. In principle this could go on forever. All languages have mechanisms such as these – modification, coordination and clause insertion – that make the number of sentences limitless. Obviously, all of the possible sentences of a language cannot be stored in a dictionary format in our heads. Sentences are composed of discrete units that are combined by a system of rules. This rule system explains how speakers can store the potential for creating an infinite number of sentences in a finite space – our brains.

As discussed in Chapter 1, there are various theories about how we acquire and represent our linguistic knowledge. Usage-based linguistic theories argue that we learn all our knowledge about language by witnessing language in use, while the theory of 'Universal Grammar' assumes that, as humans, we are born with innate linguistic knowledge. In this book, we will assume that linguistic knowledge is part of our biological endowment. The syntax is the part of the innate language component that represents a speaker's knowledge of syntactic categories and how they combine to form sentence representations. The aim of this chapter is to explore what we know about syntax as speakers of a language.

In this chapter, we will introduce a rule system that was developed by linguists in the 1960s. Although current syntactic theory is now represented differently, this early rule system is an excellent starting point for understanding the structure of sentences. The idea is that our syntactic knowledge gives us the ability to acquire the particular rule system of the language that is spoken around us, whatever it happens to be. The focus in this chapter will be on the mental grammar of English, although it should be noted that there could be some slight variations for different varieties of English.

What syntax rules do

The rules of syntax combine morphemes and words into phrases, and phrases into sentences. Among other things, the rules determine the correct word order for a language. For example, English is a Subject–Verb–Object (SVO) language while Japanese is a Subject–Object–Verb (SOV) language. English has quite a strict SVO word order, so if we switch the Subject and the Object, we get a different meaning. This means that 'Nadal defeated Djokovic' does not have the same meaning as 'Djokovic defeated Nadal'.

Sometimes, however, a change of word order has no effect on meaning.

He slowly took off his coat.

He slowly took his coat off.

*Coat off he his slowly took

In English and in every language, every sentence is a sequence of words, but not every sequence of words is a sentence. Sequences of words that conform to the **rules of syntax** are **well formed** or grammatical, and those that violate the syntactic rules are **ill formed** or ungrammatical. Although a sequence like *Coat off he his slowly took* consists of legitimate English words, the entire expression is without meaning because it does not comply with the syntactic rules of the grammar. (By convention, the asterisk at the beginning of the sentence indicates ungrammaticality.)

The rules of syntax also specify the **grammatical relations** of a sentence, such as **subject**, **direct object** and **indirect object**. In other words, they provide information about who is doing what to or for whom. This information is crucial to understanding the meaning of a sentence. For example, in the sentence below, the subject of the sentence is *Kate*, the direct object is *a message* and the indirect object is *William*.

Kate sent a message to William.

Sentences that are written in a text are linear – one word follows another, so that sentences look like strings of words lined up in a row. Also, when we speak, one word comes out after the other. However, sentences are not just sequences of words – they have internal organisation. This can be illustrated with the Jack and Jill sentences below, which are variations on *Jack and Jill ran up the hill* and *Jack and Jill ran up the bill*. At first glance, these two sequences of words look identical.

rules of syntax
Principles of **grammar** that account for the grammaticality of sentences, their hierarchical structure, their word order, whether there is structural ambiguity, etc.; see also **phrase structure rule, transformational rule**.

well formed
Describes a grammatical sequence of words, one conforming to rules of syntax.

ill formed
Describes an ungrammatical or anomalous sequence of words.

grammatical relation
Any of several structural positions that a noun phrase may assume in a sentence.

subject
The noun phrase in an S(sentence) that appears immediately below the S in a **phrase structure tree**.

direct object
The noun phrase (NP) that appears immediately below the verb phrase (VP) that is sister to the verb; the noun phrase complement of a transitive verb.

indirect object
The noun phrase that is either (i) inside a PP that appears immediately below the verb phrase (VP) or (ii) immediately below the VP. The indirect object occurs in addition to a direct object NP, and often expresses the recipient of an action, e.g. *the boy* in *Susan gave the puppy to the boy* and *him* in *Susan gave him the puppy*.

1 a Jack and Jill ran up the hill.
  b *Jack and Jill ran the hill up.
  c Up the hill ran Jack and Jill.
  d Jack and Jill ran up the bill.
  e Jack and Jill ran the bill up.
  f *Up the bill ran Jack and Jill.

A closer look at these examples shows us that the phrase *ran up the hill* behaves differently from the phrase *ran up the bill* despite their surface similarity. For the expression *ran up the hill*, the rules of the syntax allow the word orders in (a) and (c), but not the one in (b). In *ran up the bill*, by contrast, the rules allow the order in (d) and (e), but not (f). The pattern illustrates that sentences are not simply a linear string of words. If they were, there would be no reason to expect *ran up the hill* to pattern differently from *ran up the bill*. These phrases act differently because they have different syntactic structures associated with them. In *ran up the hill*, the words *up the hill* form a unit, as follows:

He ran [up the hill].

The whole unit can be moved to the beginning of the sentence, as in (c), but its subparts cannot be rearranged, as shown in (b). On the other hand, in *ran up the bill*, the words *up the bill* do not form a natural unit, so they cannot be moved together, and (f) is ungrammatical. Our syntactic knowledge crucially includes rules that tell us how words form natural groups in a sentence, and how they are hierarchically arranged with respect to one another. Consider the following sentence:

The captain ordered all old men and women off the sinking ship.

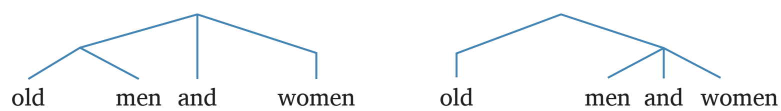
This phrase *old men and women* is ambiguous, referring to either old men and to women of any age or to old men and old women. The ambiguity arises because the words *old men and women* can be grouped in two ways. If the words are grouped as follows, *old* modifies only *men*, and so the women can be of any age.

[old men] and [women]

When they are grouped as follows, the adjective *old* modifies both *men* and *women*:

[old [men and women]]

The rules of syntax allow both of these groupings, which is why the expression has more than one meaning and is ambiguous. The following hierarchical diagrams, also called tree diagrams, illustrate the same point:



In the first structure *old* and *men* group together under the same node and hence *old* modifies *men*. In the second structure *old* shares a node with the entire conjunction *men and women*, and so modifies both. This is similar to what is found in morphology for ambiguous words such as *unlockable*, which have two structures corresponding to two meanings, as discussed in Chapter 4.

structural ambiguity
The phenomenon in which the same sequence of words has two or more meanings based on different syntactic analyses.

Many sentences exhibit such **structural ambiguities**, often leading to humorous results. Consider the following two sentences, which appeared in classified ads:

For sale: an antique desk suitable for lady with thick legs and large drawers.

We will oil your sewing machine and adjust tension in your home for $10.

Because these ambiguities result from different structures, they are instances of structural ambiguity. Contrast these sentences with:

This will make you hot.

The two interpretations of this sentence are due to the two meanings of *hot* – 'warm in temperature' and 'attractive'. Do you see others? Such lexical or word-meaning ambiguities are not discussed in this chapter.

So far, we have suggested that a system of syntactic rules allows speakers to produce and understand a limitless number of sentences never produced or heard before – the creative aspect of linguistic knowledge. The rules reveal the grammatical relations among the words of a sentence as well as their order and hierarchical organisation. That is, syntactic rules are used to represent what speakers know about the sentence structure of their language. They also explain how the natural grouping of words relates to the meaning of the sentence, such as when a sentence or phrase is ambiguous.

> *Colorless green ideas sleep furiously*. This is a very interesting sentence, because it shows that syntax can be separated from semantics – that form can be separated from meaning. The sentence doesn't seem to mean anything coherent, but it sounds like an English sentence.
>
> Howard Lasnik, *The Human Language: Part One*, 1995

The ability to make grammaticality judgements does not depend on having heard the sentence before. You may never have heard or read the following sentence but your syntactic knowledge tells you that it is grammatical.

Enormous crickets in pink socks danced at the ball.

Grammaticality judgements do not depend on whether the sentence is meaningful or not, as shown by the following sentences:

Colourless green ideas sleep furiously.

A verb crumpled the milk.

Although these sentences do not make much sense, they are syntactically well formed. However, they sound funny. Ideas do not sleep, let alone furiously, and neither could they be colourless and green at the same time. We can say these sentences are semantically ill formed. They differ from the following strings of words. These sentences are clearly ungrammatical because they do not obey the usual syntactic rules of English. These sentences are 'word salad':

***Furiously sleep ideas green colourless.**

***Milk the crumpled verb a.**

You may understand ungrammatical sequences even though you know they are not well formed. Most English speakers could interpret the sentence:

***The boy quickly in the house the ball found.**

although they know that the word order is irregular. They could also interpret a question like:

***Who do you think that ate my banana?**

The word order in this question is fine, but it is ungrammatical unless we delete *that*. On the other hand, grammatical sentences may be uninterpretable if they include nonsense strings, that is, words with no agreed-on meaning, as shown by the first two lines of 'Jabberwocky' by Lewis Carroll:

'Twas brillig, and the slithy toves

Did gyre and gimble in the wabe

These lines are grammatical in the sense that they obey the English word order. Such nonsense poetry is amusing because the sentences comply with syntactic rules and sound like good English. Ungrammatical strings of nonsense words, on the other hand, are not entertaining:

***Toves slithy the and brillig 'twas**

Wabe the in gimble and gyre did.

Grammaticality does not depend on the truth of sentences. If it did, lying would be impossible. Nor does it depend on whether real objects are being discussed, nor on whether something is possible. Untrue sentences can be grammatical, sentences discussing unicorns can be grammatical and sentences referring to pregnant rocks can be grammatical.

Our unconscious knowledge of the syntactic rules of grammar permits us to make grammaticality judgements. These rules are not the prescriptive rules that are taught in school, like ‘Don’t end a sentence with a preposition’. Children develop unconscious syntactic rules for their language long before they attend school, as is discussed in Chapter 7.

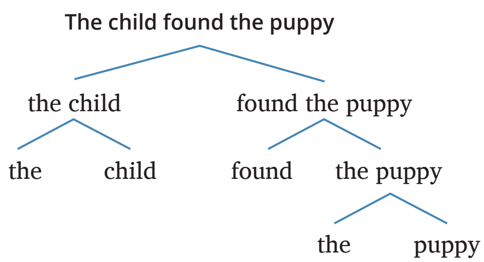
Sentence structure

> I really do not know that anything has ever been more exciting than diagramming sentences.
>
> Gertrude Stein, ‘Poetry and Grammar’, 1935

Syntactic rules determine the order of words in a sentence, and the organisation of the groups of words. The words in the sentence:

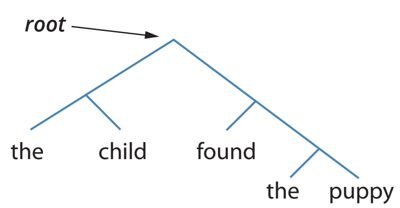
The child found the puppy.

may be grouped into [the child] and [found the puppy], corresponding to the subject and predicate of the sentence. A further division gives [[the child] [[found][the puppy]]], and finally the individual words [[[the][child]] [[found][[the][puppy]]]]. It is easier to see the parts and subparts of the sentence in a tree diagram, which illustrates the hierarchical structure of sentences:



The ‘tree’ is upside down with its ‘root’ being the entire sentence, *The child found the puppy*, and the ‘branches’ leading to its ‘leaves’, which are the individual words, *the*, *child*, *found*, *the* and *puppy*. The diagram can be redrawn, showing the words just as ‘leaves’:

The tree diagram conveys the same information as the nested brackets, but more clearly. The groupings and subgroupings are reflected in the hierarchical structure of the tree. From the tree diagram, we know that the phrase *found the puppy* divides naturally into two branches, one for the verb *found* and the other for the direct object *the puppy*. A different division, say, *found the* and *puppy*, is unnatural.



Constituents and constituency tests

constituent
A syntactic unit in a tree diagram.

The natural groupings of words in a sentence are called **constituents**. Various syntactic tests reveal the constituents of a sentence. These tests can be applied to groups of words to find out if the group of words is a constituent or not.

The first test is the 'standalone' test. If a group of words can stand alone as a fragment answer to a question, they form a constituent. Consider the following:

> **Constituency tests**
>
> What did the child find?
> The puppy.
> *Found the.

The test shows that the group of words *the puppy* can stand alone as a fragment answer to the question, while the group of words *found the* cannot. This test supports our judgement that *the puppy* is a meaningful linguistic unit while *found the* is just two words listed one after the other.

The second test is the 'replacement by a pro-form' test. There are several kinds of pro-forms. Pronouns are one kind of pro-form and can substitute for natural groups of words. Consider the following question and answer

> **Constituency tests**
>
> Where did you find *the puppy*?
> I found *him* in the park.

Here, the pronoun *him* is replacing *the puppy*. When the group of words *the puppy* is replaced by the pronoun, the result is a grammatical sentence, so we can conclude that *the puppy* is a constituent. There are also words, such as *do*, that can take the place of an entire expression, such as in *found the puppy*.

> **Constituency tests**
>
> John found the puppy and so did Bill.
> John found the puppy and Bill did too.

When we hear *so did Bill* or *Bill did too*, we understand that Bill also *found the puppy*. This tells us that the group of words *found the puppy* is a constituent. We have seen in these examples that pronouns and words like the auxiliary verb *do* are both pro-forms.

A third test of constituency is the 'move as a unit' test. If a group of words can be moved or relocated to another position, they form a constituent. For example, if we compare the following sentences to the sentence *The child found a puppy* we can see that a certain group of words has moved.

> **Constituency tests**
>
> It was *a puppy* the child found.
> *A puppy* is what the child found
> *A puppy* was found by the child.

In all of these examples, the constituent *a puppy* has moved from its position following *found*. In all such rearrangements the constituents *a puppy* and *the child* remain intact. In the sentence *The child found a puppy* the natural groupings or constituents are the subject *the child*, the predicate *found a puppy*, and, within the predicate, the direct object *a puppy*. *Found a* cannot be moved because it is not a constituent.

The 'coordination' test is a fourth test that is useful when it is unclear whether two strings of words are of the same natural grouping. Only constituents of the same syntactic category can be coordinated. Consider the following example:

> **Constituency tests**
>
> What did the puppy do?
> *He threw up his breakfast and up his dinner
> He threw up his breakfast and his dinner

The coordination test shows that *up his breakfast* and *up his dinner* cannot be conjoined, suggesting that they are not constituents. In fact, *up* is part of the phrasal verb 'throw up'. It is possible to coordinate *his breakfast* and *his dinner*, however, which tells us that these two strings of words are the same kind of constituent.

We can summarise this section by evaluating whether or not the string of words *in the garden* from the sentence *The puppy played in the garden* passes the constituency tests, as shown in **Table 5.1**. 'Q' and 'A' abbreviate 'Question' and 'Answer'.

Constituency tests

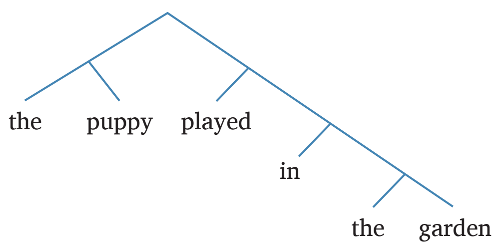
Table 5.1 The constituency tests

Question: Is the string of words *in the garden* a constituent?	
1 Standalone test	**Q:** Where did the puppy play? **A:** *In the garden*
2 Replacement by a pro-form	The puppy played ~~in the garden~~ The puppy played *there*
3 Move as a unit test	**a** It was *in the garden* that the puppy played. **b** *In the garden* is where the puppy played
4 Coordination test	The puppy played *in the garden* and *on the porch*

In the above examples, the group of words *in the garden* passes all tests. In each case, the test yields a grammatical sentence and so it is safe to conclude it is a constituent. The standalone test shows that *in the garden* can be used as a fragment answer to a question. It can also be replaced by the pro-form *there.* The move as a unit test shows us that *in the garden* can be moved from its original position without any loss of grammaticality. Sometimes, however, you may find that a particular test does not work for a particular string of words. If so, try another test. It is always a good idea to try several tests.

constituent structure
The hierarchically arranged syntactic units, such as noun phrase and verb phrase, that underlie every sentence.

Our knowledge of the **constituent structure** of a sentence may be graphically represented as a tree diagram. The tree structure for the sentence *The puppy played in the garden* is as follows:



In addition to the syntactic tests just described, experimental evidence has shown that speakers do not mentally represent sentences as strings of words, but rather in terms of constituents. In these experiments, participants listen to sentences that have clicking noises inserted into them at random points. In some cases the click occurs at a constituent boundary. For example, the click might occur between the subject and the predicate, that is, between *the puppy* and *played in the garden*. In other sentences, the click is inserted in the middle of a constituent, for example, between *the* and *puppy*. Participants are then asked to report where the click occurred. There have been two important results: first, participants in these experiments noticed the click and recalled its location best when it occurred at a constituent boundary. Second, clicks that occurred inside the constituent were reported to have occurred between constituents. In other words, the participants displaced the clicks and put them at constituent boundaries. These results suggest that speakers perceive sentences in chunks corresponding to grammatical constituents, and thus provide evidence for the psychological reality of constituent structure.[1] Every sentence in a language is associated with one or more constituent structures.

If a sentence has more than one constituent structure, it is structurally ambiguous, and each tree will correspond to one of the possible meanings. For example, the sentence:

They are cooking apples.

has two tree diagrams associated with it, depending on whether *cooking apples* is taken to be an activity or the kind of apple. If the activity is cooking apples, then *cooking* is a verb and *apples* is the object of the sentence. But if *cooking apples* is the type of apple, then *cooking* could be analysed as an adjective. Notice that if sentences did not have hierarchical structure, we would not be able to explain this ambiguity. We would not be able to explain why one linear sequence of words gives rise to two different meanings. We will discuss structural ambiguity further later in the chapter.

Syntactic categories

This section reviews the different kinds of constituents or **syntactic categories** that form sentences. The theory of Universal Grammar discussed in this chapter assumes that knowledge of syntactic categories is part of our innate linguistic knowledge. Children do not have to figure out the different syntactic categories in their language by listening to their parents' and caretakers' language. The child's task is simply to learn the mapping between the words in their language and the various syntactic categories.

The constituents that form sentences are sometimes called phrases, or **phrasal categories**. You may have heard of the terms 'noun phrase', 'verb phrase' and so on. The different phrases will be discussed shortly. The first task is to review the different **lexical categories** that are at the heart of phrases: nouns, verbs, adjectives, adverbs and prepositions.

Lexical categories have content associated with them. In traditional grammar, the lexical categories are often defined by their meanings. You may have been taught that a noun is a 'person, place or thing', that a verb describes an 'action or state' and that an adjective describes qualities or properties of a thing. These traditional definitions are useful as rule-of-thumb definitions, but they are not very accurate. For example, there are nouns that do not seem to fit the 'person, place or thing' definition. Some nouns, such as *marriage* and *destruction*, refer to events while others, such as *happiness* and *loneliness* refer to states. We can use abstract nouns, such as *honour* and *beauty*, rather than adjectives, to refer to properties and qualities and so on.

Because of the difficulties involved in specifying the precise meaning of lexical categories, categories are not usually defined in terms of their meanings, but in terms of distributional criteria.

Distributional criteria: defining categories

Distributional criteria involve trying morphological tests, to see what kind of derivational and inflectional affixes a word can take, as well as investigating its syntactic environment, to see what other words it can combine with and what position it can take in the sentence structure. It is a good idea to check a few different tests because they are not always foolproof.

syntactic category
Traditionally called 'parts of speech'; expressions of the same syntactic category can generally substitute for one another without loss of grammaticality.

phrasal category
The class of **syntactic categories** that comprises the highest-level categories, including NP, VP, AdjP, PP and AdvP. See also **lexical category** and **functional category**.

lexical category
A general term for the word-level **syntactic categories** of **noun**, **verb**, **adjective**, **adverb** and **preposition**.

distributional criteria
Criteria for testing the **syntactic category** of a word that depend on the affixes a word combines with and its position in a phrase or sentence.

Lexical categories

You will already know from your study of morphology in Chapter 4 that **nouns (N)** take both derivational and inflectional suffixes. There are many derivational suffixes (e.g. *-ness*, *-ment*, *-ion* etc.), and which one is appropriate depends on the noun itself. Most nouns take a suffix for plural, though, so this is a useful and fairly foolproof test. You can check to see if the word can be pluralised by adding *-s* (*tips*), *-es* (e.g. *patches*), or the more unusual *-ren* (e.g. *children*), *-a* (e.g. *phenomena*) and so on. If one of these suffixes can be added, then the word is a noun. Another reliable test that uses syntactic distribution is the article test. Nouns combine with articles like *the* and *a* and with demonstratives like *this* or *that* (e.g. *the top*, *the swimming pool*, *this app*). Another test is to see whether the word can appear after an adjective (e.g. *beautiful music*, *fast swimming*, *unfortunate incident*).

Verbs (V) also take both derivational and inflectional suffixes. The inflectional suffixes for tense provide the most reliable test. A verb should be able to take the past-tense ending *-ed* or *-t* (e.g. *emailed*, *jumped*, *learnt*) or a present-tense ending *-s* when it has a third-person singular subject (e.g. *Mary jogs*, *it rains*, *he drinks*). A verb can also be combined with an adverb (e.g. *run fast*, *sing loudly*) and it can be combined with a modal (e.g. *may visit*, *can hurdle*, *will pass*).

There are a variety of tests for **adjectives (Adj)**. One test is to try the comparative form. The adjective should either be able to take an *-er* inflectional suffix (e.g. *hungrier*, *faster*, *easier*) or be able to follow *more* (e.g. *more beautiful*, *more rigid*, *more efficient*). A distributional syntactic test is to see if the potential adjective can sit between a determiner and a noun (e.g. *a silly joke*, *the tall building*, *some ridiculous paperwork*). Adjectives can also follow *is* (and other auxiliary verbs) (e.g. *he is silly*, *the building is tall*) but verbs can also appear in this position, so the test is just one of several to check. Finally, adjectives can usually be preceded by *very* (e.g. *very silly*, *very nice*, *very fast*), but adverbs can also, so this test will not distinguish between adjectives and adverbs.

Linguists sometimes point out that **adverbs (Adv)** are best characterised by the positions in which they are ungrammatical, rather than where they are grammatical. This is because some adverbs are quite flexible in where they can appear. One position where adverbs cannot appear is between the determiner and the noun (e.g. **the loudly song*, **the quickly jog*, **the often snoring*). As noted in the discussion of adjectives, adverbs too are frequently preceded by *very*, so this is another test to try (e.g. *very quickly*, *very often*, *very loudly*).

Prepositions (P) are more difficult to identify using tests. They are a closed-class set, so sometimes they are included in the list of functional categories, rather than lexical categories. We will treat them as lexical categories in this text. Distributionally, prepositions are always followed by a noun phrase (e.g. *in the box*, *over the moon*). Many but not all prepositions express locational meanings.

A quick guide to the tests for the various lexical categories can be found inside the back cover of this textbook.

The lexical categories we have just reviewed can combine with other linguistic material to form a constituent or phrase. The lexical category is the basic part of the phrase and called its **head**. In other words, a noun phrase has a noun as its head, the head of a verb phrase is a verb, the head of a preposition phrase is the preposition and so on.

Let us use some of these tests to identify the lexical categories in the sentence *A magnificent black cat walked stealthily towards the fishpond*, as shown in Table 5.2. In each case, if applying the test yields a grammatical result, we can assume that the test has identified the relevant grammatical category. Here we give examples of how lexical categories can pass the relevant tests.

noun (N)
The **syntactic category** of words that can function as the head of a noun phrase, such as *book*, *Jean*, *sincerity*. In many languages, nouns are grammatically marked for number, case and gender and occur with determiners.

verb (V)
The **syntactic category** of words that can be the head of a verb phrase. Semantically, verbs can denote actions, sensations and states. Two syntactic tests that identify verbs are the ability to combine with adverbs and with modals.

adjective (Adj)
The **syntactic category** of words that function as the head of an **adjective phrase** and that have the semantic effect of qualifying or describing the referents of nouns; see also **adjective phrase.**

adverb (Adv)
The **syntactic category** of words that qualify the verb, such as manner adverbs like *quickly* and time adverbs like *soon*. Some adverbs, such as *very*, qualify adjectives. The position of the adverb in the sentence depends on its semantic type.

preposition (P)
The **syntactic category** that can function as the head of a prepositional phrase.

Table 5.2 **Morphological tests: lexical categories** **Worked example**

Lexical category	Test	Example	Test result
Noun	Derivational suffix – pluralisation	cats fishponds	Pass: We can add the suffix -s to pluralise *cat* and *fishpond*.
	Article/demonstrative test	a cat the fishpond this cat	Pass: The articles *a*, *the* and the demonstrative *this* can combine with *cat* and *fishpond*.
	Adjective test	magnificent cat black cat	Pass: Cat can be used after both *magnificent* and *black.*
Verb	Inflectional suffix – the tense test	walked walks	Pass: The past tense or present tense endings can be added to *walk*.
	Adverb test	walked stealthily	Pass: *Walked* can be followed by *stealthily*.
Adjective	Comparative form test	More magnificent Blacker	Pass: *Magnificent* can be used with *more* and *black* can take the derivational *-er* suffix.
	Determiner-noun test	a magnificent cat that black cat	Pass: Both *magnificent* and *black* can be sandwiched between an article or demonstrative and a noun like *cat*.
	'Very' test	very magnificent very black	Pass: 'Very' combines well with *black*, and also combines with *magnificent* though it is less natural.
Adverb	'Very' test	very stealthily	Pass: 'Very' combines with *stealthily.*
	Determiner-Noun test	*the stealthily cat	Pass: *Stealthily* is ungrammatical when inserted between a determiner and noun.
Preposition	Noun phrase test	towards the fishpond	Pass: *Towards* can be followed by a noun phrase like *the fishpond*.

Phrasal lexical categories

head (of a phrase)
The central word of a phrase whose **lexical category** defines the type of phrase.

Next, we turn to the different phrasal categories. The phrasal lexical categories are all constituents. We introduce the different phrasal lexical categories, investigating what elements they can contain, and how we can identify them, using substitution as well as the constituency tests we have already discussed. Knowledge of the different kinds of phrases is also part of our innate knowledge of syntax.

Let us begin with noun phrase (NP). An NP will always contain a head noun, but it may contain other material. An NP often contains a determiner like the articles *a* or *the* alongside the noun. (We will discuss determiners in more detail later in this section). NPs can also contain one or more adjectives. NPs may also have no determiner (e.g. *Dogs eat bones*) and may consist of just a proper noun (e.g. *John* or *Mickey Mouse*) or a pronoun (e.g. *he* or *them*).

We can do a substitution test to check we have an NP. For example, *the child* belongs to a family that includes *the police officer*, *your neighbour*, *this magnificent black cat*, *he* and countless others. We can substitute any member of this family for *the child* without affecting the grammaticality of a given sentence, although the meaning, of course, would change. This tells us that these combinations of words are all NPs. There are some examples below. Notice that this test shows that proper nouns like *John* and pronouns like *he* have the same distribution as the other groups of words, and so technically, we can consider them to be NPs also. NPs can also be very complex, such as *the girl who lives next door*. The NP *the girl* has a whole clause inside it. Recall that trying to see if a group of words can be substituted with a pronoun like *he* is, in fact, the pro-form constituency test.

The police officer found a puppy.

Your neighbour found a puppy.

This magnificent black cat found a puppy.

John found a puppy

He found a puppy

The girl who lives next door found a puppy

In the preceding examples, we substituted groups of words into subject position of the sentence. As a further check, we can see that such words or groups of words can also be slotted into object position, which also suggests they are NPs.

The puppy loved *him*.

The puppy loved *John*.

The puppy loved *the police officer*.

We can try to insert a group of words that is a potential NP into subject or object position of a variety of structures to see if it yields a grammatical sentence. Consider the items in list (2) that follows, and try to insert them into the object position in *Who found* __*?* or the subject position in the sentence ___ *was seen by everyone*.

2 a a bird
  b the red guitar
  c have a nice day
  d with a balloon
  e the woman who was laughing
  f it
  g John
  h went.

The substitution test reveals that **Who found* ***with a balloon****?* is ungrammatical, for example, as is *****Went*** *was seen by everyone*. These tests suggest that *with a balloon* and *went* are not NPs. We find that (c), (d), and (h) are ungrammatical. These ungrammatical sentences contrast with the sentences in which an NP is inserted, such as *Who found* ***the red guitar****?* or ***A bird*** *was seen by everyone*. The expressions that can be substituted, and produce a grammatical sentence are (a), (b), (e), (f) and (g).

Notice that the pronoun *it* was among the words and phrases used to test NPs. This particular pronoun was used because it can be used in subject or object position without changing its form. For example, we can say *Who found it?* or *It was seen by everyone,* and both sound fine. Unlike ordinary nouns, many pronouns have a different form depending on whether they are being used in subject or object position. For example, we cannot say **Who found she?* or **Him was seen by everyone*. There are also different pronominal forms for possessive pronouns. The form of pronoun that is usually in subject position is sometimes called the nominative form of the pronoun, the form in object position is said to be the accusative form, and the possessive pronoun is often called the genitive form. These terms may be familiar if you have studied other languages that use morphological endings to show case; that is, whether a particular NP is the subject, or object and so on, of the sentence. In Modern English, only pronouns vary their form, depending on their position in the sentence. Other NPs, such as *the puppy*, and names like *John* maintain the same form, whether they are in subject or object position in the sentence. The different forms of pronouns are summarised in **Table 5.3**.

Table 5.3 **The pronominal paradigm**

Person	Subject pronoun		Object pronoun		Possessive pronoun	
	Singular	Plural	Singular	Plural	Singular	Plural
First	I	we	me	us	my	our
Second	you	you	you	you	your	your
Third masculine	he	they	him	them	his	their
Third feminine	she	they	her	them	her	their
Third neuter	it	they	it	them	its	their

As we noted, the constituency tests can also be used to identify any constituent, including NP constituents. In **Table 5.4**, we test whether or not the group of words *a magnificent black cat* from our previous sentence *A magnificent black cat walked stealthily towards the fishpond* passes the constituency tests. If it yields a grammatical sentence in each case, we can identify it as an NP because the head word of the constituent is the noun *cat*. It is worth reiterating that if a string of words passes a test, then this is evidence it is a constituent. If, however, a string of words does not pass a test, it is a good idea to try another test. If all of the tests fail, you have no evidence that the string of words is a constituent.

Constituency tests

Table 5.4 **Constituency tests: potential NP constituent**

Constituency test	Example	Test result
Standalone test	Q: Who walked stealthily towards the fishpond? A: *A magnificent black cat.*	Pass: *A magnificent black cat* can stand alone as a grammatical answer to the question.
Pro-form test	*He* walked stealthily towards the fishpond.	Pass: *A magnificent black cat* can be replaced by the pro-form *he/she/it* and produce a grammatical sentence.
Move as a unit test	It was *a magnificent black cat* that walked stealthily towards the fishpond.	Pass: *A magnificent black cat* can be moved into a cleft structure 'It is/was…' and produce a grammatical sentence. (Other movement tests can also be used.)
Coordination test	*A magnificent black cat and a mangy orange kitten* walked stealthily towards the fishpond	Pass: *A magnificent black cat* can be coordinated with a similar phrase of the same type, *a mangy orange kitten*, and produce a grammatical sentence.

Our next phrasal syntactic category for discussion is the **verb phrase (VP)**. The expression we have discussed at length, *found a puppy*, is a VP. VPs always contain a verb (V) and they may also contain other categories. The VP *found a puppy* contains a verb and a NP. We can try a substitution test. In list (3) that follows, the VPs are those phrases that can substitute for *found a puppy* and complete the sentence *The child* ___.

3 a saw a clown
  b a bird
  c slept

verb phrase (VP)
The **syntactic category**, also **phrasal category**, comprising expressions that contain a verb as the **head** along with its **complements**, such as noun phrases and prepositional phrases.

d clever
e is clever
f found the cake
g found the cake in the cupboard
h realised that the earth was round.

Inserting (a), (c), (e), (f), (g) and (h) will produce grammatical sentences, whereas the insertion of (b) or (d) would result in an ungrammatical string. Thus, this test tells us that in list (3), (a), (c), (e), (f), (g) and (h) are VPs and the others are not. As with NPs, VPs vary in their complexity. The VPs in (g) and (h) are more complex than (c), for example, which contains only a verb (*slept*). The VP in (g) contains an NP in object position as well as a prepositional phrase (to be discussed) and the VP in (h) contains another clause.

We can use the constituency tests to investigate whether or not a proposed group of words is a VP. We can hypothesise that in our sentence *A magnificent black cat walked stealthily towards the fishpond* that *walked stealthily towards the fishpond* is a VP. **Table 5.5** below investigates whether or not this group of words passes the different constituency tests. If so, we can conclude it is a VP because we know that the head word of the constituent is the verb *walk*.

Constituency tests

Table 5.5 **Constituency tests: potential VP constituent**

Constituency test	Example	Test result
Standalone test	Q: What did a magnificent black cat do? A: *Walk stealthily towards the fishpond.*	Pass: *Walk stealthily towards the fishpond* can stand alone as a grammatical answer to the question.
Pro-form test	A magnificent black cat *walked stealthily towards the fish pond* and a mangy orange kitten *did too*.	Pass: *Walked stealthily towards the fishpond* is replaced by the pro-form appropriate for a VP, *did (too)*, in the conjoined clause. We understand the conjoined clause to mean *a mangy orange kitten walked stealthily towards the fishpond*.
Move as a unit test	*Walk stealthily towards the fishpond* is what a magnificent black cat did.	Pass: *Walk stealthily towards the fishpond* has been preposed. Preposing moves constituents to the initial position in the sentence and in this case produces a grammatical sentence.
Coordination test	A magnificent black cat *walked stealthily towards the fishpond* and *caught a large goldfish*.	Pass: *Walked stealthily towards the fishpond* has been conjoined with *caught a large goldfish*, producing a grammatical sentence. This suggests they are constituents of the same kind.

All of the lexical categories have a phrasal equivalent. As well as the lexical category adjective, then, there are **adjective phrases (AdjP)**. AdjPs have less flexibility than NPs and VPs in the sense that they cannot combine with such a wide variety of other elements. AdjPs can contain just an adjective, such as *big*, or *happy* and so on. AdjPs can also contain an adverb, as in *very big* or *extremely happy*. Finally, some AdjPs can also contain a prepositional phrase, as can be seen in AdjPs like *tired of work* and *proud of her achievements* (where the phrases starting with *of* are prepositional phrases).

adjective phrase (AdjP)
A **syntactic category**, also **phrasal category**, comprising expressions whose head is an adjective possibly accompanied by modifiers, that occurs inside noun phrases and as **complements** of the verb *be*.

We will use these more complex word groupings to test for AdjPs as these will yield tests that are easier to interpret. This time we will test the word grouping *proud of her achievements* in the sentence *As she gained recognition, Greta became proud of her achievements*, as shown in **Table 5.6**. Remember, if our group of words passes the constituency tests, we can reason that the group of words is a constituent. Below, we can take the further step of identifying the constituent as an AdjP constituent because the head word of the constituent is the adjective *proud*.

Constituency tests

Table 5.6 Constituency tests: potential AdjP constituent

Constituency test	Example	Test result
Standalone test	Q: What did Greta become as she gained recognition? A: *Proud of her achievements.*	Pass: *Proud of her achievements* can stand alone as a grammatical answer to the question.
Move as a unit test	*Proud of her achievements* is what Greta became as she gained recognition.	Pass: *Proud of her achievements* has been preposed and the resulting sentence is grammatical.
Coordination test	Greta became *proud of her achievements* but *weary of attention* as she gained recognition.	Pass: *Proud of her achievements* and *weary of attention* have been conjoined (with the conjunction *but*) and the result is a grammatical sentence, confirming they are constituents of the same type.

In the case of AdjPs, there is no appropriate pro-form to use for the Pro-form test.

We can add **adverb phrase (AdvP)** to our list of phrases. AdvPs often specify how or when an event happens. AdvPs are even more restricted in what they combine with. AdvPs can contain just an adverb, but the adverb that is head of the AdvP can also be modified by another adverb. This is true in the phrases *very quickly* or *extremely beautifully*, where *very* modifies *quickly* in that it explains how quickly the event took place, and *extremely* modifies *beautifully*.

adverb phrase (AdvP)
A **syntactic category**, also **phrasal category**, comprising expressions whose head is an adverb possibly accompanied by modifiers.

Once again, we can test whether a word or group of words we hypothesise to be an AdvP is indeed so by using the constituency tests. To do so, as shown in **Table 5.7**, we take the word *stealthily* from the sentence *A magnificent black cat walked stealthily towards the fishpond*. There is no appropriate pro-form to use for the Pro-form constituency test.

Constituency tests

Table 5.7 **Constituency tests: potential AdvP constituent**

Constituency test	Example	Test result
Standalone test	Q: How did a magnificent black cat walk towards the fishpond? A: *Stealthily.*	Pass: *Stealthily* can stand alone as a grammatical answer to a question, confirming it is a constituent.
Move as a unit test	*Stealthily* is how a magnificent black cat walked towards the fishpond.	Pass: *Stealthily* has been preposed to initial position in this structure, producing a grammatical sentence. This confirms that it is a constituent.
Coordination test	A magnificent black cat walked *quietly* and *stealthily* towards the fishpond.	Pass: *Stealthily* has been conjoined with *quietly*, suggesting that both are the same kind of constituent.

prepositional phrase (PP)
The **syntactic category**, also **phrasal category**, comprising expressions that consist of a preposition plus a noun phrase.

The last phrasal category to be reviewed here is **prepositional phrase (PP)**. Earlier, various constituency tests determined that the grouping of words *in the garden* was a constituent – this is a PP because they always have a preposition as their head. In *in the garden*, the head of the PP is the preposition *in*. PPs are different from other categories in that they cannot consist of just a head alone; we cannot have a preposition by itself. They always consist of a preposition followed by an NP. Prepositions are usually used to express relationships between two entities involving a location (e.g. the boy is *in the room*, the cat is *under the bed*), but this is not always the case; the prepositions *of*, *by*, *about*, and *with* often have other than locational meanings.

Once more we use a group of words from our sentence *The magnificent black cat walked stealthily towards the fishpond* to test whether the word grouping *towards the fishpond* is a constituent. In this case, we identify the constituent as a PP, because the head word in the constituent is the preposition *towards*, as shown in **Table 5.8**.

Constituency tests

Table 5.8 **Constituency tests: potential PP constituent**

Constituency test	Example	Test result
Standalone test	Q: In which direction did a magnificent black cat walk? A: *Towards the fishpond*	Pass: *Towards the fishpond* can stand alone as a grammatical answer to the question.
Pro-form test	A magnificent black cat walked stealthily *there*.	Pass: *Towards the fishpond* can be replaced by the pro-form *there* and the result is a grammatical sentence.
Move as a unit	*Towards the fishpond* is where a magnificent black cat walked stealthily.	Pass: *Towards the fishpond* has been preposed to initial position in the sentence and the result is a grammatical sentence.
Coordination test	A magnificent black cat walked stealthily *towards the fishpond* and *away from the house.*	Pass: *Towards the fishpond* has been conjoined with *away from the house*, suggesting both are constituents of the same type.

Functional categories

The next topic is **functional categories**. Functional categories are so called because their members are characterised by their grammatical functions rather than descriptive meanings.

The first functional category to discuss is **determiner (Det)**. Determiners combine with nouns inside a NP and include the articles *the* and *a* – but the term has wider coverage. It also covers possessive pronouns, such as *my* in *my book* and *our* in *our representative*, and it covers quantificational or number terms that combine with a noun, such as *every*, *most*, *several*, *one*, *six* and so forth. In addition, the demonstrative pronouns *this* or *that* (e.g. *this textbook* or *that song*) come under the umbrella of 'determiner'.

Another functional category is **auxiliary (Aux)**. The functional category named auxiliary incorporates both auxiliary verbs and modals. Traditionally, auxiliary verbs are sometimes referred to as 'helping verbs' because they occur alongside a main verb in the sentence. Auxiliary verbs are forms of *have*, *be* and *do*. In the sentence *The poodle is dancing*, the relevant form of *be* is *is* and, when this auxiliary verb is used with the *-ing* form, it expresses an action that is ongoing. Likewise, in the sentence *Jenny has painted a picture,* the auxiliary verb *has* contributes to the meaning that the painting of the picture is complete. Note that the verbs *have* and *be* can be main verbs as well as auxiliary verbs. In sentences like *Suzanna is a librarian* or *My dog has fleas* there is only one verb, so the forms of *have* and *be* are serving as the main verb of the sentence. The auxiliary verb *do* appears in certain cases when there is no other auxiliary verb in the sentence. For example, it is used in negative sentences (*Raymond doesn't eat squid*), questions (*Does Raymond eat squid?*) and sentences with an elliptical (i.e. silent) VP. An elliptical VP is evident in the answer to 'Does Raymond eat squid?' A good answer might be 'Yes, Raymond does'. In the answer, the VP *eat squid* is understood but not pronounced so it is said to be an elliptical VP. The form *do* can also be a main verb. In the sentence *Pauline did her homework*, there is no verb other than *did*, so here the past tense form of *do* is a main verb.

Also belonging to the class of 'Aux' are the **modals**. This is the set of words including *can*, *could*, *may*, *might*, *must*, *shall*, *should*, *will*, *would* and so forth. It is a limited set. Modals express notions such as possibility (*Susie may dance*), necessity (*Students must report to the office*), ability (*Liz can speak Māori*) and so on. The modals also have negative forms, such as *can't*, *won't* etc.

Another functional category is **complementiser (C)**, which is a technical linguistics term and may be new to you. Complementisers are a limited set of words that are usually used to introduce an embedded clause. These words include *that*, *for*, *if* and *whether*. Some examples in which these complementisers introduce an embedded clause (i.e. another S that is lower in the hierarchy of the larger sentence) are given in **Table 5.9**. The complementisers *that* and *for* can be omitted in English without loss of grammaticality. It may be that *for* is only used in some dialects of English. Check whether or not it sounds like something you would say in your dialect.

Table 5.9 Sentences with and without complementisers

With complementiser	Without complementiser
Everybody thinks *that* the harbour is beautiful.	Everybody thinks the harbour is beautiful.
I'd prefer *for* you to come home early.	I'd prefer you to come home early.
Sam asked *if* he could play football.	*Sam asked he could play football.
I wonder *whether* it will rain later.	*I wonder it will rain later.

functional categories
Categories whose members are characterised by their grammatical functions, including **determiner**, **auxiliary**, **complementiser** and **conjunction**.

determiner (Det)
The **syntactic category**, also **functional category**, comprising words and expressions that, when combined with a noun, form a noun phrase. Includes the **articles** *the* and *a*, **demonstratives**, such as *this* or *that*, quantifiers, such as *each* and *every*, and expressions, such as *William's*.

auxiliary (Aux)
A **syntactic category** comprising auxiliary verbs and abstract tense morphemes; functions as the **head** of a sentence.

modal
An **auxiliary verb** other than *be*, *have* and *do*; such as *can*, *could*, *will*, *would* and *must*.

complementiser (C)
A **syntactic category**, also **functional category**, comprising words, including *that*, *if*, and *whether*, that introduce an embedded sentence; has the effect of turning a sentence into a complement.

conjunction (Conj)
The **syntactic category**, also **functional category**, of words that join two like syntactic categories together.

sentence (S)
A **syntactic category** comprising expressions consisting minimally of a **noun phrase (NP)**, followed by an **auxiliary (Aux)**, followed by a **verb phrase (VP)**; the head of S is Aux.

complementiser phrase (CP)
A phrase whose head C may introduce a **complementiser** (e.g. *that*) and possibly a preposed Aux, and whose complement is S.

selection
Refers to the complement types that particular verbs or other lexical items can take.

complement
The constituent(s) in a phrase other than the head that complete(s) the meaning of the phrase and is(are) **c-selected** by the verb.

c-selection
The classifying of verbs and other lexical items in terms of the **syntactic category** of the **complements** that they accept (*c* stands for *categorial*), sometimes called subcategorisation.

Our last functional category to review is **conjunction (Conj)**. Again, a very limited set of words can act as conjunctions: *and*, *or* and *but*. Conjunctions generally conjoin items of the same syntactic category as we saw in the coordination test earlier. For example, we can talk about *hot days and cool nights* where two NPs are conjoined, or *sip tea or nibble nuts* in which two VPs are joined together.

Phrasal functional categories

Unlike the lexical categories, not all of the functional categories have phrasal counterparts. In the system of syntax developed in this chapter, there are two functional categories that have a corresponding phrasal category. The phrasal category of auxiliary is **sentence (S)** and complementisers also have a corresponding phrasal category, **complementiser phrase (CP)**. These categories are introduced in **Table 5.10** to complete the list of syntactic categories for English. However, they need some explanation and we will return to them and will go through the constituency tests for CP later in the chapter.

Table 5.10 The functional categories

Functional categories	
Determiner (Det)	the, a, my, his, your, each, some, many, two, several, this, those
Auxiliary (Aux)	have, be, do, can, may, might, must, will, shall, should, would, could
Complementiser (C)	that, if, for, whether
Conjunction (Conj)	and, or, but
Phrasal functional categories	
Sentence (S)	Beavers build dams, I love tacos, The PM said there will soon be a surplus
Complementiser phrase (CP)	that I love tacos, if we can go tomorrow, whether it will rain

All languages have syntactic categories, such as N, V and NP. Speakers of a language know the syntactic categories of their language even if they do not know the technical terms for them. According to the theory of Universal Grammar, this is because knowledge of the various syntactic categories is part of our innate knowledge of language. By contrast, the usage-based view of language assumes we learn what syntactic categories our language uses, even if this learning is implicit. Either way, our knowledge of syntactic categories is revealed in our judgements when equivalent phrases are substituted, and through the various syntactic tests that have been discussed.

Selection

In Chapter 4 we observed that we store information about different lexical categories in our mental dictionary. In addition to information about whether a given lexical item is a noun, verb, adjective etc. we also store detailed information about **selection**. Selection is information about whether a given lexical category takes a **complement** or more than one complement or no complements at all. It is particularly important to know the selection properties of verbs, and what constituent(s) that they require to complete their meaning. This kind of selection is often called **c-selection**, where *c* stands for categorial selection. The syntactic component of the grammar uses this information so that when we form sentences, we conform to the selection properties of verbs. There is another kind of selection also. This is called **s-selection**, or semantic selection. This refers to the semantic requirements of verbs, such as whether they require an animate subject, or the object NP to be liquid and so on. Our focus will be c-selection.

The properties of the verb determine its complement structure; for example, the verb *find* requires a direct object complement that is an NP. A verb that takes a direct object is termed a **transitive verb**. The following examples demonstrate that *find* must be followed by an NP. The examples below in which the NP is omitted are ungrammatical:

The boy found the ball.

*The boy found quickly.

*The boy found in the garage.

A verb that does not take a complement is an **intransitive verb**. Thus, verbs like *sleep*, *yawn*, *arrive*, *bark* and so on do not select a complement. If we attempt to use an NP complement, the result is ungrammatical:

Michael slept.

*Michael slept a nap.

Some verbs take more than one complement. The verb *put* occurs with both an NP and a PP and cannot occur with either alone. We conclude that *put* takes two complements because both of these are obligatory.

Sarah put the milk in the refrigerator.

*Sarah put the milk.

*Sarah put in the refrigerator.

There are also verbs, such as *eat*, that can drop their complement, although it could be argued that it is, nevertheless, understood. One could argue that the meaning is slightly different when the complement is dropped. Some researchers have argued that when *eat* has no complement, it means *dine*.

John ate a meatball sandwich.

John eats at restaurants regularly.

A verb may appear with optional constituents in addition to its complement(s). These optional constituents are called **adjuncts**. We already determined that *find* selects an NP complement, but it can also appear with an optional PP (e.g. *in the garage*). Likewise, although *put* selects an NP complement and a PP complement, it can also have, for example, another optional PP expressing time (e.g. *after breakfast*):

The boy found the ball in the garage.

Sarah put the milk in the refrigerator after breakfast.

Complements always stay adjacent to the verb that selects them and are followed by the adjuncts if there are any. If this ordering is changed and the adjunct is placed before the complement, the result is ungrammatical. For example, if the adjunct *in the garage* is placed before the complement *the ball*, the sentence is ungrammatical, even though the meaning is understandable.

*The boy found in the garage the ball.

*Sarah put after breakfast the milk in the refrigerator.

Some verbs, such as *think*, select a sentence as complement. Other verbs, such as *tell*, select both an NP and an S, while *feel* selects an AdjP or a sentence complement. This differs by verb.

I think that Tony won the bike race.

I told Veronica that Max was on his treadmill.

They felt happy.

s-selection
The classifying of verbs and other lexical items in terms of the semantic category of the **head** and **complements** that they accept.

transitive verb
A verb that **c-selects** an obligatory noun phrase complement.

intransitive verb
A verb that must not have (does not **c-select** for) a direct object **complement**.

adjuncts
An optional phrase that is not selected by the verb.

They feel that they can win.

*They feel.

Some verbs can be used with a wide variety of complements. For example, the verb *ask* can appear with an NP complement or it can take a CP complement, as shown in the following example. One of these CP complements is a question. What do you think of the last complement, starting with *that*? Is this structure part of your variety of English?

I asked a question.

I asked if I could have an extension.

I asked who to contact.

I asked that he be refused entry to the club.

Selection is not exclusively about the complements that verbs select. Some nouns also have selectional requirements and take a complement; for example, the noun *belief* selects either a PP or an S, as shown by the following two examples:

Julia's belief in freedom of speech

Julia's belief that freedom of speech is a basic right

The noun *sympathy*, however, selects a PP, but not an S:

their sympathy for the victims

*their sympathy that the victims are so poor

The adjective *tired* selects a PP:

tired of stale sandwiches

The nouns *belief* and *sympathy* can also appear without complements, as can the adjective *tired*:

John has many beliefs.

The people showed their sympathy.

The students were tired.

Speakers use selection information when forming sentences. Phrases and sentences must conform to the selectional requirements of the head (i.e. N, V, Adj etc.) as well as to the phrase structure rules that are permitted in the language.

Phrase structure

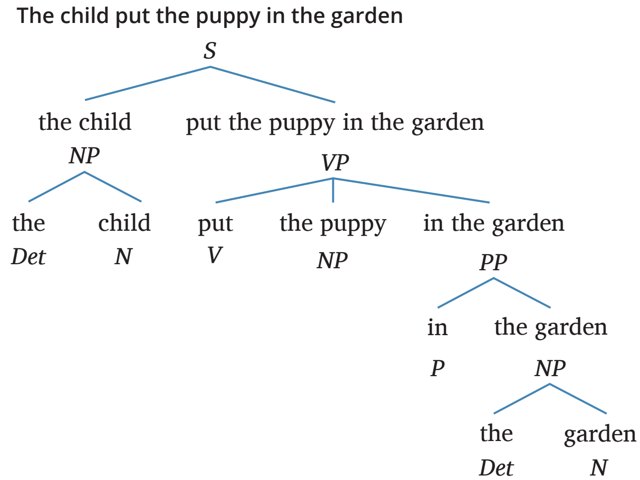
> Who climbs The Grammar-Tree distinctly knows
> Where Noun and Verb and Participle grows.
>
> John Dryden, *The Sixth Satyr of Juvenal*, 1693

Phrase structure trees

phrase structure (PS) trees
A tree diagram with syntactic categories that reveals the hierarchical structure of a sentence.

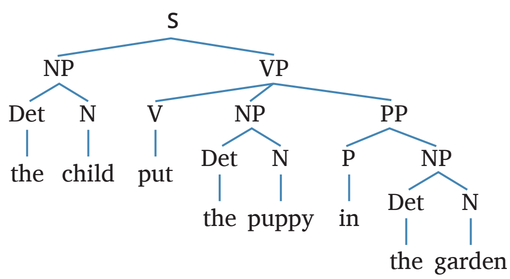
Phrase structure (PS) trees are used to demonstrate the internal structure of sentences. They are a graphic representation of a speaker's knowledge of the sentence structure of their language. PS trees present sentences as hierarchical structures and suggest that they cannot be thought of as being a linear sequence of words. The proposal that sentences are hierarchical structures allows us to explain many complex facts about language, such as ambiguity and sentence interpretation in different syntactic environments. Some of these facts are a challenge to explain on theories that do not represent sentences as hierarchical structures.

Now that the terms for the various syntactic categories have been defined, we can create a tree diagram for the sentence *The child put the puppy in the garden* and provide a label for each of the constituents. These labels show that the entire sentence belongs to the syntactic category of sentence (S), that *the child* and *the puppy* are NPs, that *put the puppy in the garden* is a VP, that *in the garden* is a PP and so on.[2]



Notice that the PS tree contains a lot of redundancy. The tree can be streamlined by writing the words only once at the bottom of the diagram. The labels now show that the entire sentence belongs to the syntactic category S. It shows that the S contains an NP (*the child*) and a VP (*put the puppy in the garden*). Syntactic categories higher in the PS tree, such as VP, consist of all the syntactic categories and words below that point, or **node**, in the tree. In the PS tree above, the VP contains a V (*put*), an NP (*the puppy*) and a PP (*in the garden*). In each case, the head of the phrase is connected to its phrasal category, which is higher in the PS tree. That is, above every N there is an NP category, above V, there is a VP and so on. In Chapter 4 we discussed the fact that the syntactic category of each word is listed in our mental dictionaries. It is now possible to see how this information is used by the syntactic component. Words occur in trees under labels that correspond to their syntactic category. Nouns are under N, prepositions under P and so on. The PS tree also indicates implicitly what combinations of words are not syntactic categories. For example, since there is no node above the words *put* and *the* to connect them, the two words do not constitute a syntactic category, reflecting our earlier judgements.

node
A labelled branch point in a phrase structure tree.



Although we need hierarchical structure to be able to represent sentences and their meanings, when we actually pronounce sentences, the words are necessarily produced in a linear sequence, one after another. The pronunciation order of the words can be read off the PS tree from left to right.

Hierarchical relations

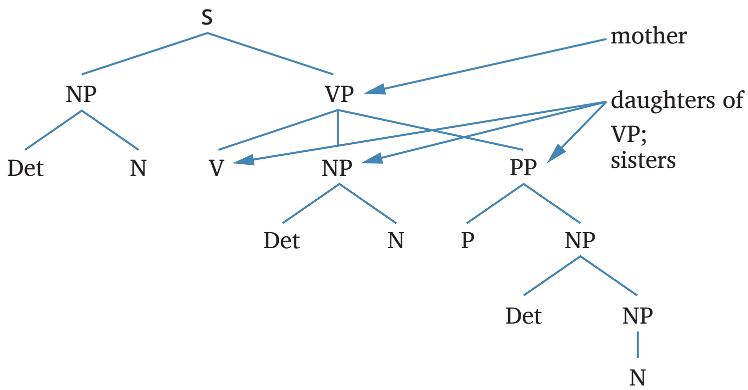
There are some useful terms that are used to talk about hierarchical relations in PS trees. Every higher node is said to **dominate** all the categories beneath it. VP dominates V, NP and PP, and also

dominate
In a **phrase structure tree**, when a continuous downward path can be traced from a node labelled A to a node labelled B, then A dominates B.

immediately dominate
In a **phrase structure tree**, if a node labelled A is directly above a node labelled B, then A immediately dominates B.

sisters
In a **phrase structure tree**, two categories that are directly under the same **node**.

dominates Det, N, P and PP and the categories below PP. A node is said to **immediately dominate** the categories one level below it. VP immediately dominates V, NP and PP but not Det, N, P, NP etc. Categories that are immediately dominated by the same node are **sisters**. In the sentence *The child put the puppy in the garden*, V, NP and PP are sisters. Continuing with the matriarchal theme, their mother is VP, and in turn, VP's daughters are the sisters V, NP and PP.



PS trees also show relationships among elements in a sentence. One kind of relationship is the relationship between the head of a phrase and the other members of the phrase. For example, the head of VP is V, but in our sentence *The child put the puppy in the garden*, there are other constituents contained in the VP that complete its meaning. For this sentence, the direct object NP *the puppy* is a complement, as is the PP *in the garden*. Both of these complements are sisters to the head of the phrase. A complement to a verb may also be an embedded sentence, as in *I thought that the child found the puppy,* where *that the child found the puppy* serves as the complement. Complements are obligatory, in the sense that unacceptability would result if they were omitted (e.g. **The child put the puppy*, **The child put in the garden*). As noted earlier, optional constituents within a phrase are called adjuncts, as in the case of *yesterday* and *in the morning* in the sentence *The child put the puppy in the garden yesterday in the morning*.

In summary, PS trees represent four aspects of a speaker's syntactic knowledge:

- the groupings of words into syntactic categories (constituents)
- the hierarchical structure of the syntactic categories
- the hierarchical relations between syntactic categories
- the pronunciation order of the words in the sentence.

PS trees that explicitly reveal these properties can represent every sentence of English and of every human language.

Phrase structure rules

phrase structure (PS) rule
Specifies the constituency of a **syntactic category**.

The information in a PS tree can also be represented by another formal device, **phrase structure (PS) rules**. PS rules capture the knowledge speakers have about the possible structures of a language. A speaker's knowledge about the permissible and prohibited structures is represented by a finite set of rules that generates sentence representations in the language.

The PS rules tell us the breakdown of each type of constituent or phrase. For example, we saw in the PS tree for *The child put the puppy in the garden* that the highest syntactic category is S, and that this branches into an NP and a VP. The VP contained a V, an NP and a PP; the NPs all contained a determiner and an N; and the PP contained a P and an NP. The information can be represented with PS rules. Each rule represents a section of the PS tree. We saw that S branches into NP and VP. This can be represented with the following rule. (Note that rules that will be revised later in the chapter are indicated as being ‘not final’, which will be designated by ‘NF’, and ‘final’ rules are followed by ‘F’).

S → NP VP (NF)

PS rules give us an ordering within the syntactic category. For example, the S rule above tells us that an S consists of an NP followed by a VP in that order.

PS rule for S

Let us now return to the PS rule for sentence (S). Linguists have proposed that all phrasal categories have heads. For uniformity’s sake, we want all the syntactic categories to have the same kind of internal structure, but this means that the S should have a head associated with it. What would the head of S be? To answer this question, let us consider the following sentences:

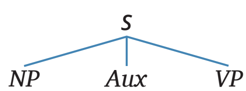
The boy will kick the ball.

The boy has kicked the ball.

The boy is kicking the ball.

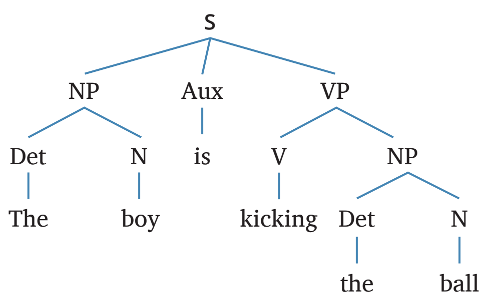
The boy may kick the ball.

These examples all contain an auxiliary verb or a modal. Auxiliary verbs specify a time frame for the sentence, whether the situation described by the sentence will take place, has already taken place or is taking place now. Modals express possibility, necessity of an event taking place and so on. On reflection, sentences are about situations or events that occur or might occur at some point in time, so the category Aux is a natural category to head S. Our PS rule for S can be amended to include Aux as head of S, as illustrated:



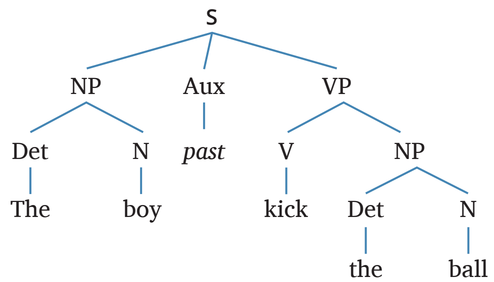
S → NP Aux VP (F)

The following PS tree shows the structure for *The boy is kicking the ball*, in which the auxiliary verb *is* positioned in Aux:

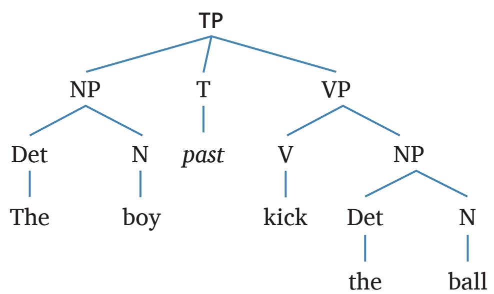


Not all sentences contain auxiliary verbs. For example, the sentence *The boy kicked the ball* has no modal or auxiliary verb. There is, however, a time reference for this sentence, namely that expressed by the past tense of the verb *kicked*, so the tense needs to be specified somewhere in our PS tree. Instead of having a function word like *is* or *may* in the Aux position, there is a specification for tense, *present* or *past*, as in the following PS tree. This tense specification, which is often called a tense **feature**, will become associated with the main verb via a ‘transformation’ (which we will see shortly). Notice that the PS tree shows the verb in its stem form before the past tense has become associated with it.

feature
Specifies a property of a **syntactic category**; Aux is specified for tense and person.

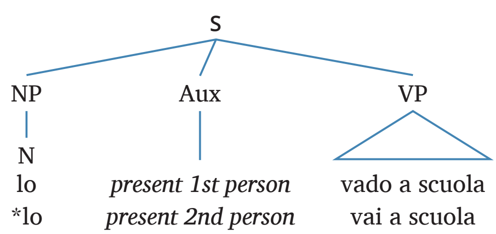


You may have noticed that with Aux and S, there is no continuity between the name for the head and the phrasal category. To better express the idea that Aux is the head of S, the symbols T (tense) and TP (tense phrase) are currently used by many linguists instead of Aux and S. This is illustrated for the sentence *The boy kicked the ball* in the following PS tree:



In this text, we will continue to use the symbols S and Aux, but you should think of Aux and S as having the same relationship to each other as V and VP, N and NP and so on.

In addition to specifying the time reference of the sentence with a specification for tense, Aux specifies the agreement features of the subject. For example, if the subject is *we*, Aux contains the features first-person plural; if the subject NP of the sentence is *he* or *she*, Aux contains the features third-person singular. Thus, another function of the syntactic rules is to use Aux as a 'matchmaker' between the subject and the verb. When the subject and the verb bear the same features, Aux makes a match; when they have incompatible features, Aux cannot make a match and the sentence is ungrammatical. For example, the subject and the auxiliary verb in Aux are mismatched in a sentence like **The poodle are dancing*, which explains its ungrammaticality. This matchmaker function of syntactic rules is more obvious in languages such as Italian, which have many different agreement morphemes, as discussed in Chapter 4. Consider the Italian sentence for 'I go to school'. The structure of the VP is simplified and simply shown as a triangle in the PS tree below:



The verb *vado*, 'go', in the first sentence bears the first-person singular morpheme, *-o*, which matches the agreement feature in Aux, which in turn matches the subject *lo*, 'I'. Hence, the sentence is grammatical. In the second sentence, there is a mismatch between the first-person subject and the second-person features in Aux (and on the verb), and so the sentence is ungrammatical.

Sentences can also be specified as not expressing tense. This property is also specified in Aux. Sentences without tense are always embedded sentences (putting aside cases such as headlines, like 'Biden to be President'). We will see the CP rule for embedded sentences shortly. For now, our interest is in sentences that do not contain an auxiliary verb or modal and are not specified as present or past in the Aux. Some examples include:

The host wants *us to leave early*. (cf. We leave early.)

We want *to leave early*.

We tried *to leave early*.

Embedded sentences with a complement that does not have tense like the ones above are called **infinitive** sentences. Notice that in the examples, the verb in the embedded clause is the '*to* + stem' form of the verb. The *to* would be positioned in Aux to express the specification of no tense. Verbs such as *want*, *try* and *believe* among many others can take an infinitive complement. This information, like other selectional properties, belongs in the lexical entry of the selecting verb (the higher verb in the PS tree).

infinitive
The uninflected or stem form of a verb that does not express tense, e.g. *(to) swim*.

PS rule for NP

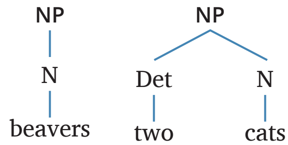
The rule for NP that we started with is:

NP → Det N (NF)

This rule allows us to generate NPs such as *the boy*, *some bananas*, *my books* and so on. However, not every NP has a determiner. Sentences such as *Beavers build dams* are grammatical, yet neither NP appears with a determiner. Likewise, names such as *Mary* and *Superman* do not appear with a determiner in English. Our rule needs to account for the fact that some NPs only have a head noun. The optionality of the determiner is indicated by adding parentheses, as shown in the following:

NP → (Det) N (NF)

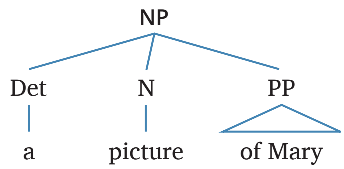
This rule allows PS trees such as:



Our NP rule needs further revision because an NP may also contain a complement, as in *a picture of Mary* or *the destruction of Rome*. We can accommodate this fact by revising the rule to include an optional PP:

NP → (Det) N (PP) (NF)

This revised rule says that an NP can contain an optional determiner followed by a noun followed by an optional PP. An example with a PP is shown below. The PP is shown with a triangle since the structure of PPs has not yet been discussed in detail.



There is still more complexity that we can add to our rule for NP. For example, we want to be able to include an AdjP inside the NP rule so that the rule will generate NPs like *a fantastic burger* or *two boring books*. The rule can be further revised as:

NP → (Det) (AdjP) N (PP) (NF)

We will unpack the PS rule for AdjPs shortly. There is one more fact to handle – sometimes multiple AdjPs or PPs are permitted within an NP. We could have said a *delicious juicy burger* or *two thin boring books*, in which two different adjectives modify the noun. Likewise, multiple PPs are possible, as in *two boring books with torn covers on the shelf*, in which *with torn covers* and *on the shelf* are both PPs. The possibility of iterative or multiple uses of a syntactic category is indicated by a + sign, as in our final rule for NP:

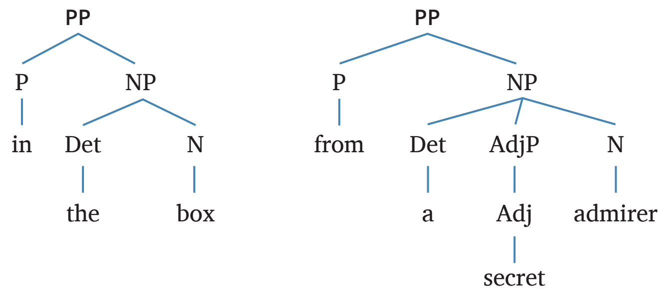
NP → (Det) (AdjP +) N (PP +) (F)

PS rule for PP

Although PPs have been included in our NP rule, we have not yet seen the PS rule for PPs. PPs are different from NPs in that they do not have any optional constituents. They always contain the head of the phrase P and its complement NP, which is obligatory. The rule is as follows:

PP → P NP (F)

Below are the trees for the PPs *in the box* and *from a secret admirer*.

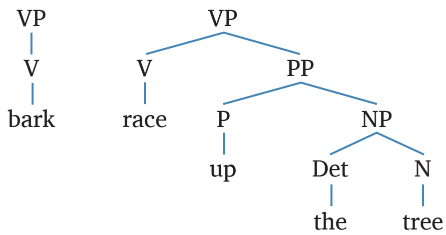


PS rule for VP

The first approximation of the VP rule encountered in our example sentence *The child put the puppy in the garden* showed a VP that consisted of a V followed by an NP and a PP, as follows:

VP → V NP PP (NF)

However, only the head of the VP – the verb – is obligatory. VPs can contain only a verb, as in sentences like *Dogs bark*, and we can have VPs that do not have a direct object NP, as in *The cat raced up the tree*. The tree structures for these simple VPs are as follows:



This tells us that both the NP and the PP must be optional, so parentheses should be added to these categories, as in the rule below:

VP → V (NP) (PP) (NF)

There are still some adjustments to make to the VP rule. First, AdvPs can appear within a VP in various positions. Consider the following sentences:

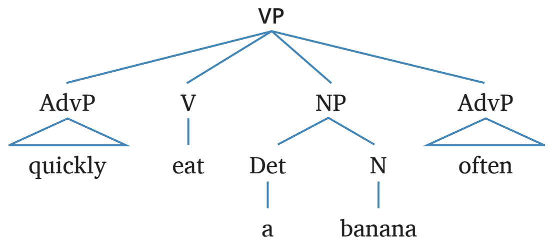
Sarah often eats a banana.

Sarah eats a banana often.

Sarah quickly eats a banana often.

Sarah eats a banana in the morning often.

This suggests that the VP rule must be complicated by permitting AdvPs to appear in three different positions. Here is the tree for the VP *quickly eats a banana often*, in which there are two AdvPs. Since the internal structure of AdvPs has not yet been introduced, they are represented with a triangle.



The VP can also have multiple AdvPs and multiple PPs, so the '+' is added into the rule below:

VP → (AdvP +) V (NP) (AdvP +) (PP +) (AdvP +) (NF)

Another possibility is to have an AdjP inside the VP. This is needed for sentences like *Syntax is fun* in which an AdjP follows the verb. To allow an optional AdjP, the PS rule for VP needs to be further adjusted:

VP → (AdvP +) V (NP) (AdjP) (AdvP +) (PP +) (AdvP +) (NF)

There is one final adjustment to make to our VP rule. Although it has become quite complex, the rule still only generates simple sentences. We need to be able to represent the creative aspect of language, in which one sentence can be embedded under another (which can be further embedded under another sentence and so on). For example, the PS rules should be able to generate sentences in which there are two clauses, such as *Superman knows that he must hurry to the crime* or *I wonder if the pasta is good*. To do this, the syntactic category CP must be introduced into the PS rule for VP.

VP → (AdvP +) V (NP) (AdjP) (CP) (AdvP +) (PP +) (AdvP +) (F)

We introduce the motivation for the CP constituent next and discuss how the PS rule for CP allows us to introduce another sentence into the structure.

PS rule for CP

As we already discussed, a complementiser is an element that turns a sentence into a complement. Recall there are only a few complementisers in English: *that*, *for*, *if* and *whether*.

Constituency tests make it clear that the complementiser and the S form a constituent. For example, the standalone test, the move as a unit test and the replacement by a pro-form test all show that the embedded S and the complementiser act together as a constituent. Since CP is a phrase that is likely to be new to you. In **Table 5.11** we will go through the constituency tests for the sentence *Sam asked if he could play football*, to find out whether or not *if he could play football* passes the constituency tests. Assuming the group of words *if he could play football* passes the tests we can assume that it is a CP constituent, since we know that the head word in the constituent is the complementiser *if*.

Constituency tests

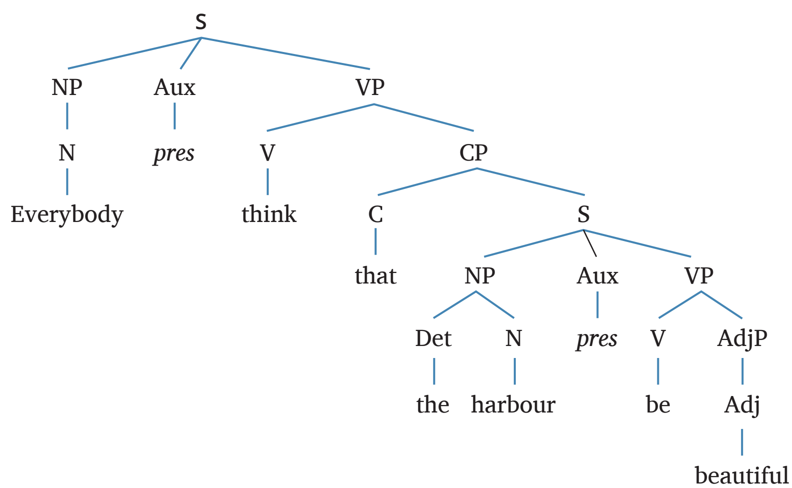
Table 5.11 **Constituency tests: potential CP constituent**

Constituency test	Example	Test result
Standalone test	Q: What did Sam ask? A: *If he could play football.*	Pass: *If he could play football* can stand alone as a grammatical answer to the question.
Pro-form test	Sam asked *it*.	Pass: *If he could play football* can be replaced by the pro-form *it* and the result is grammatical (even if not very informative).
Move as a unit	*If he could play football* is what Sam asked.	Pass: *If he could play football* has been preposed to initial position in the sentence and the result is a grammatical sentence.
Coordination test	Sam asked *if he could play football* and *whether his friends could come for dinner after*.	Pass: *If he could play football* has been conjoined with *whether his friends could come for dinner*, suggesting both are constituents of the same type.

These tests confirm that the complementiser *if* forms a constituent with S, which means there must be some category dominating both *if* and S that is inside the VP. We could run through similar tests for the complementisers *for*, *that* and *whether* too. The syntactic category that dominates S is CP. The relevant PS rule is shown below. The syntactic category complementiser is abbreviated as either C or Comp:

CP → C S (F)

The CP rule is illustrated in the PS tree below for *Everybody thinks that the harbour is beautiful*. It can be seen that although we ended up with a VP rule that contained a lot of options, the only part of the complex VP rule that is needed for this sentence is VP → V CP. Once the PS tree contains CP, another S can be added into the structure. Notice that in the embedded clause, the verb is *be* because this is the stem form of the verb; once the present-tense feature is associated with *be* the verb is pronounced as *is*.

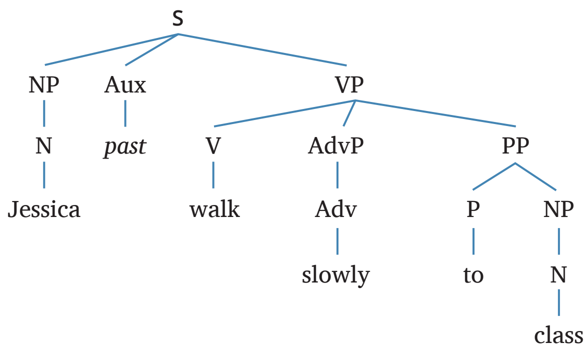


PS rules for AdjP and AdvP

In elaborating our NP and VP rules earlier, both AdjPs (AdjPs) and AdvPs were introduced without much detailed discussion. AdvPs are quite flexible in where they can appear within the VP, and three different possibilities were incorporated into the PS rule for VP. However, the PS rule for AdvP itself is relatively simple. We can begin with the PS rule that tells us an AdvP just contains an adverb:

AdvP → Adv (NF)

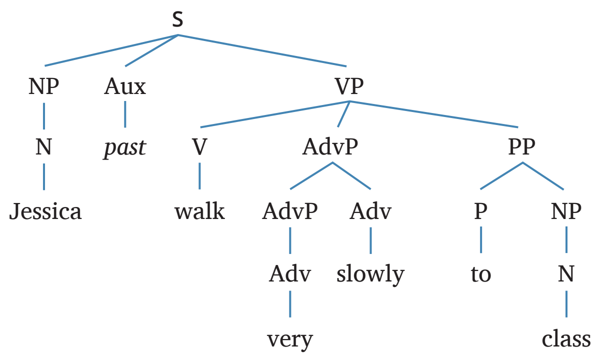
For a sentence like *Jessica walked slowly to class*, this PS rule for AdvP would work, and the corresponding PS tree would be as follows:



However, what if we wanted to say *Jessica walked very slowly to class*? In this sentence, the adverb *very* is modifying *slowly*, in that it is indicating how slowly Jessica walked. The PS rule we need allows one adverb to modify another adverb. This can be achieved by allowing another AdvP into the rule, as follows. This gives us the final AdvP rule:

AdvP → (AdvP) Adv (F)

This PS rule can now be used to generate the correct structure for *Jessica walked very slowly to class*. Notice that we would not want both of the AdvPs to branch off from the VP because then *very* would be modifying the verb *walked*, which is not the case.



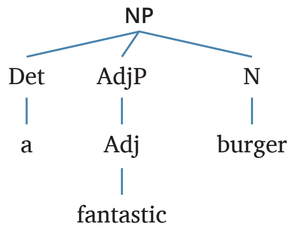
Turning to AdjPs, we saw earlier that AdjPs are often incorporated inside an NP, as in *a fantastic burger*. For this particular NP, we need the PS rule 'NP → Det AdjP N'. So far, we have not unpacked the PS rule for AdjP. For our example *a fantastic burger*, all that the AdjP contains is the adjective head, *fantastic*. This PS rule is:

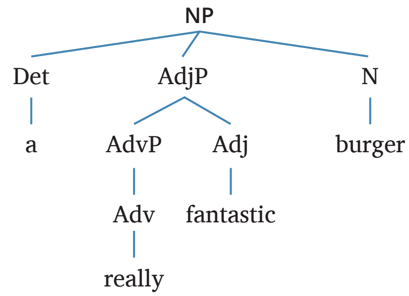
AdjP → Adj (NF)

However, it would appear that adjectives, too, can be modified by an adverb. Suppose we wanted to describe how fantastic the burger was, by saying *a really fantastic burger* or *an incredibly juicy burger*. To incorporate this into our PS rule, an AdvP must be introduced into the rule:

AdjP → (AdvP) Adj (NF)

Now it is possible to draw the PS trees for NPs containing AdjPs, such as *a fantastic burger* and *a really fantastic burger*:

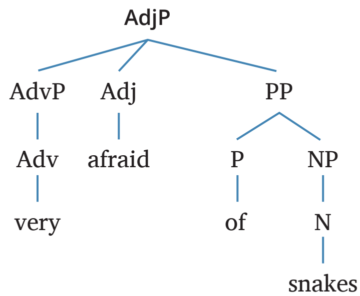




There is one more property of adjectives to consider. Certain adjectives can take a complement. This can be illustrated by the expressions *proud of his son*, *worthy of praise*, and *afraid of snakes*. In each of these expressions, the adjective has a PP complement (in which the P is *of* followed by an NP). Only some adjectives take complements. This means that the PS rule for AdjP needs to be adjusted to our final rule, as follows:

AdjP → (AdvP) Adj (PP) (F)

The PS tree for *very afraid of snakes* uses our AdjP rule:



PS rule for conjunction

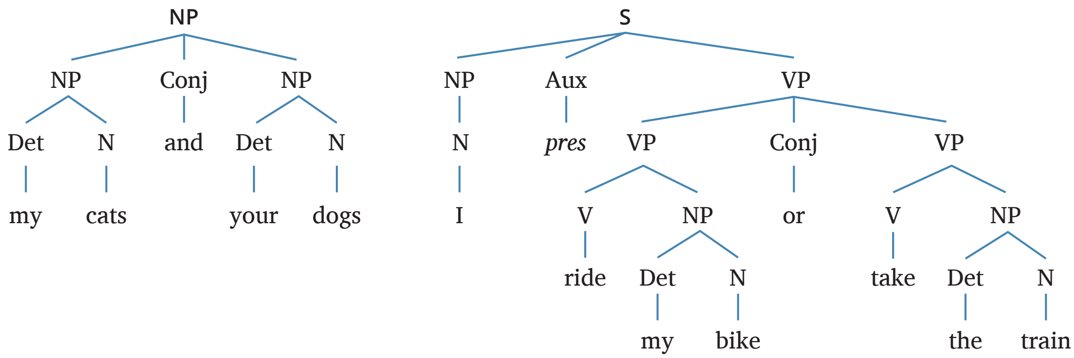
Conjunction allows us to join together two phrases of the same syntactic category. We will call the syntactic category for conjunction 'Conj'. Here are some examples:

my cats and your dogs	(NP Conj NP)
in the morning or at dusk	(PP Conj PP)
walk quickly or run slowly	(VP Conj VP)

As always, the PS rules should be as general as possible. Rather than having a separate conjunction rule for each syntactic category, we can substitute XP for any syntactic category and have just one rule, as follows:

XP → XP Conj XP (F)

Let us illustrate this first with the phrase *my cats and your dogs*, and then with the sentence *I ride my bike or take the train*. Notice that in the PS trees, NP or VP has been substituted for XP as appropriate.



Our mini-grammar of PS rules can now generate many sentences of English. A summary of the PS rules is shown in **Table 5.12**.

Table 5.12 **Summary of PS rules**

S → NP Aux VP
NP → (Det) (AdjP+) N (PP+)
PP → P NP
VP → (AdvP +) V (NP) (AdjP) (CP) (AdvP +) (PP +) (AdvP +)
CP → C S
AdvP → (AdvP) Adv
AdjP → (AdvP) Adj (PP)
XP → XP Conj XP

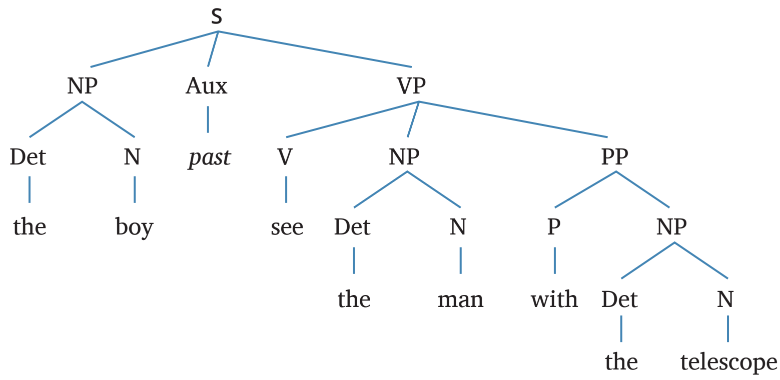
Structural ambiguities

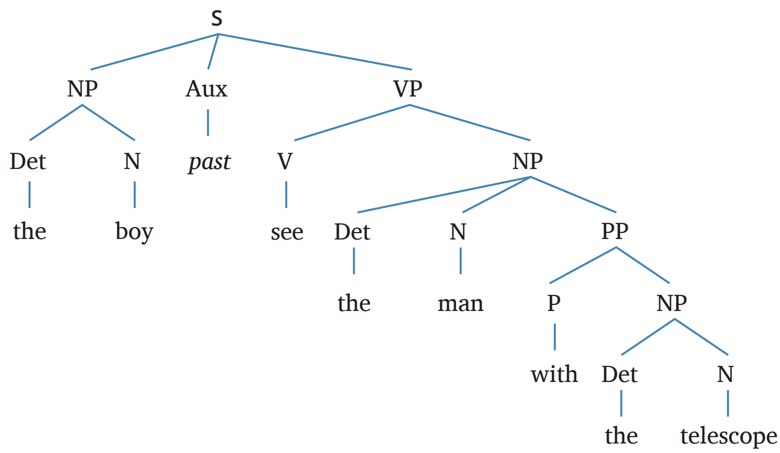
Structural ambiguities are often the source of humour or plays on words in headlines, as we can see in **Figure 5.1**. Consider the sentence I bought an antique desk suitable for a lady with thick legs and large drawers. This sentence is ambiguous, and therefore has two tree diagrams associated with it. In one structure the phrase *a lady with thick legs and large drawers* describes the lady and forms a constituent; it could stand alone in answer to the question *Who did you buy an antique desk for?* In its second meaning, the phrase *thick legs and large drawers* modifies the phrase *desk for a lady*; it could stand alone in answer to the question *What did the desk have?*

Figure 5.1 **An example of structural ambiguity in use**

Hilary B. Price/King Features Syndicate

Another ambiguous sentence is *The boy saw the man with the telescope*. Its two meanings correspond to the following two PS trees:





One meaning of this sentence is 'the boy used a telescope to see the man'. The first PS tree represents this meaning. The key element is the position of the PP directly under the VP. Although the PP is under VP, it is not a complement because it is not selected by the verb. The verb *see* selects an NP only. Therefore, in this sentence, the adjunct PP modifies the verb.

In its other meaning, 'the boy saw a man who had a telescope', the PP *with the telescope* occurs under the direct object NP, where it modifies the noun *man*. In this second meaning, the complement of the verb *see* is the entire NP – *the man with the telescope*.

The PP in the first structure is generated by the rule:

VP → V NP PP

In the second structure the PP is generated by the rule:

NP → Det N PP

Two interpretations are possible because the rules of syntax permit different structures for the same linear string of words.

The infinity of language

> So, naturalists observe, a flea
> Hath smaller fleas that on him prey;
> And these have smaller fleas still to bite 'em,
> And so proceed ad infinitum.
>
> Jonathan Swift, *On Poetry, a Rhapsody*, 1733

As noted earlier, the number of sentences in a language is infinite, because speakers can lengthen any sentence by various means, such as introducing multiple adjectives. Recursion even shows up in children's rhymes, as illustrated by the rhyme about the house that Jack built.

This is the farmer sowing the corn,
that kept the cock that crowed in the morn,
that waked the priest all shaven and shorn,
that married the man all tattered and torn,
that kissed the maiden all forlorn,
that milked the cow with the crumpled horn,
that tossed the dog,
that worried the cat,
that killed the rat,
that ate the malt,
that lay in the house that Jack built.

The PS rules of the language capture this limitless aspect of language. We can produce sentences in which various syntactic categories are repeated over and over again. This property of language is known as **recursion**, and rules that allow us to loop back and repeat a PS rule are called **recursive rules**. Proponents of the theory of Universal Grammar claim that recursion is a unique property of human languages and the property that distinguishes human language from other systems of communication, such as animal communication.

This is not our first introduction to recursion. We have seen that one sentence can be embedded under another in sentences like *The public knows that climate change is a serious issue*. We could add another clause and say *Greta Thunberg thinks that the public knows that climate change is a serious issue* and so on. In order to embed multiple clauses and repeat S, we need to use several rules. Here we show just the critical parts of the relevant PS rules, omitting optional phrases:

S → NP Aux VP

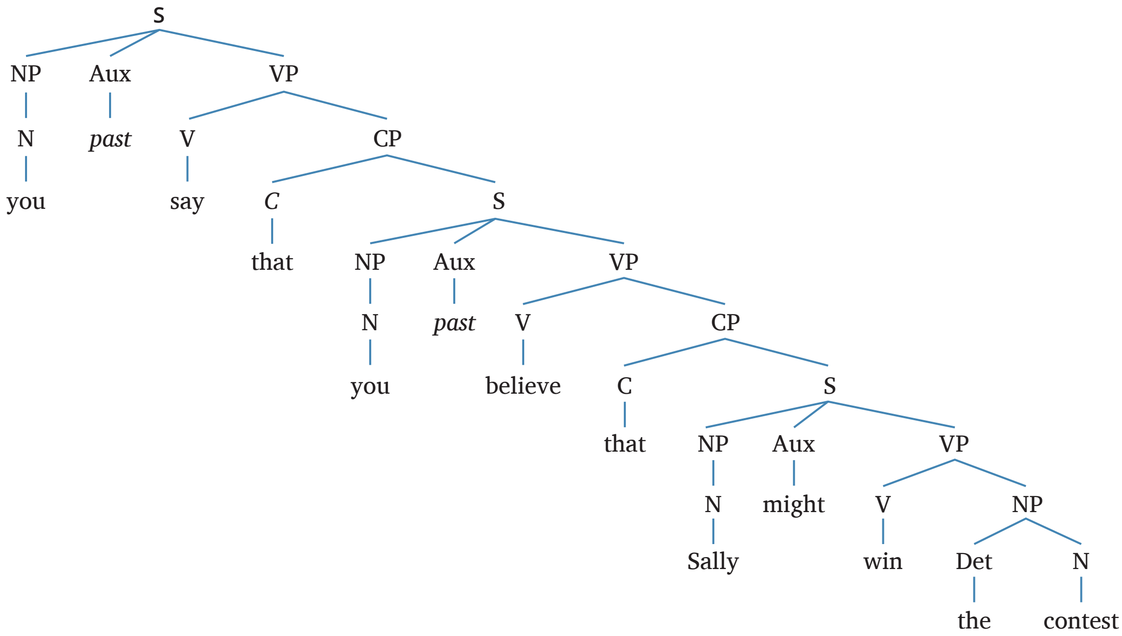
VP → V CP

CP → C S

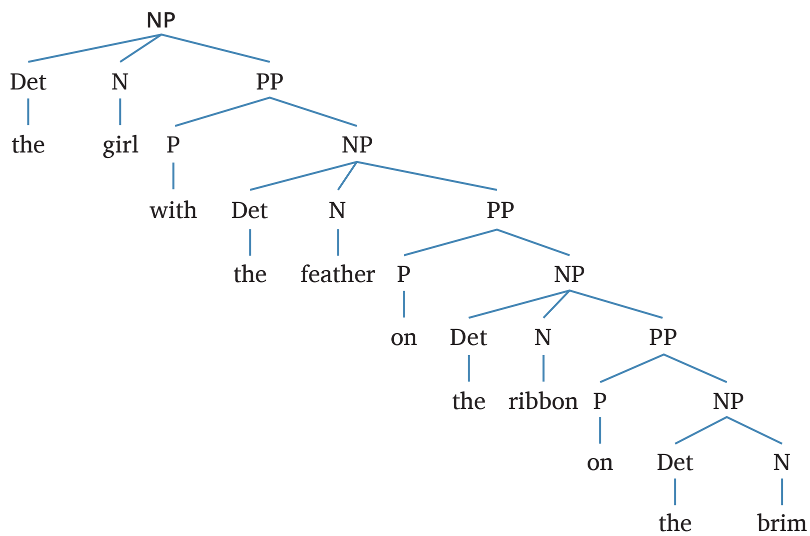
recursion
The property of human language that accounts for its infinite nature, permitting one sentence to be embedded under another ad infinitum.

recursive rules
A **phrase structure rule**, or series of phrase structure rules, that repeats the category on the left of the arrow on the right side of the arrow, hence permitting phrase structures of potentially unlimited length, corresponding to that aspect of speakers' **linguistic competence**.

The structure of a sentence with two embedded clauses, *You said that you believed that Sally might win the contest*, is illustrated below:



Another case of recursion is when multiple PPs are used. The complex (but comprehensible) NP *the girl with the feather on the ribbon on the brim*, as shown in the following PS tree, illustrates that one can repeat the number of NPs under PPs under NPs without limit.



The NP in the diagram above, though cumbersome, does not violate any rules of syntax and is a grammatical NP. Moreover, it can be made even longer by expanding the final NP – *the brim* – by adding a PP – *of her hat* – to derive the longer phrase *the girl with the feather on the ribbon on the brim of her hat*. In this case also, we have a recursive set of two rules, with both NP and PP being repeated on either side of the arrow in the set of rules

NP → Det N PP

PP → P NP

Recursion is a property that is common to all human languages. It means that a finite set of PS rules allows us to potentially produce or understand an infinite set of sentences. Recursion also highlights the difference between competence and performance discussed in Chapter 1.

All speakers of English (or any other language) have as part of their linguistic competence – their mental grammars – the ability to put NPs in PPs in NPs ad infinitum. However, as the structures grow, they become increasingly difficult to produce and understand. This could be due to short-term memory limitations, muscular fatigue, or any number of performance factors. Thus, while such rules give a speaker, in principle, access to infinitely many sentences, no speaker utters or hears an infinite number in a lifetime; nor is any sentence more than a few clauses long, although in principle there is no upper limit on sentence length.

Movement

> Method consists entirely in properly ordering and arranging the things to which we should pay attention.
>
> René Descartes, *Oeuvres*, vol. X, c. 1637

PS rules allow us to characterise a limitless number of sentences, but do not account for the fact that certain sentence types in the language relate systematically to other sentence types. The sentences below contain the same information about a sleeping event. The difference is that the sentences in the left column are declarative sentences that assert the event, while the sentences in the right column are yes–no questions that request information. This difference is indicated by a systematic difference in word order, which we want to capture as part of our grammar.

The boy is sleeping.	Is the boy sleeping?
The boy can sleep.	Can the boy sleep?
The boy will sleep.	Will the boy sleep?

The PS rules that we have do not account for the word order in the yes–no questions, in which the Aux comes first, followed by NP then VP. One solution would be to add an extra PS rule to our mini-grammar that would generate the questions above:

S → Aux NP VP

Although such a rule might do the job of producing the right word order, it would fail to capture the generalisation that the yes–no questions are systematically related (in both form and meaning) to their declarative counterparts. Since the grammar must account for all of a speaker's syntactic knowledge, we must look beyond PS rules.

Linguists have captured the relationship between related sentences by proposing that related sentences share a common underlying structure. The basic structures of sentences conform to the PS rules of the language; these are called deep structures or **d-structures**. Related sentence structures are derived by a transformational rule. Movement transformations relocate linguistic material to another position in the phrase structure. The derived structures that result from the application of the transformational rule are called surface structures or **s-structures**. In some cases, several transformational rules may apply, and then the s-structure is the result after all of the transformations have applied.

d-structure
Refers to the phrase structure tree before any transformations take place.

s-structure
The phrase structure tree that is formed after any transformations have been completed.

Returning to yes–no questions, the movement transformation that relates the declarative sentence and the yes–no question specifies that the material in Aux must move to a position preceding the subject NP:

The boy is sleeping	(declarative sentence)
Is the boy ___ sleeping?	(yes–no question)

It is important to keep in mind that the arrows in the diagram above are shorthand for one PS tree being transformed into another, that is, a d-structure being transformed into an s-structure. We will return to discuss the yes–no question movement transformation in more detail.

Transformations like the one for yes–no questions move linguistic material from one position to another, but others insert material or delete material in a PS tree. Once all of the transformations have applied, the rules of the language that determine pronunciation apply to the s-structure.

passive sentence
A sentence in which the verbal complex contains a form of *to be* followed by a verb in its participle form. In a passive sentence, the direct object of a transitive verb in **d-structure** functions as the subject in **s-structure**.

Other sentence types that are transformationally related are **passive sentences**, *there* sentences and PP preposing sentences:

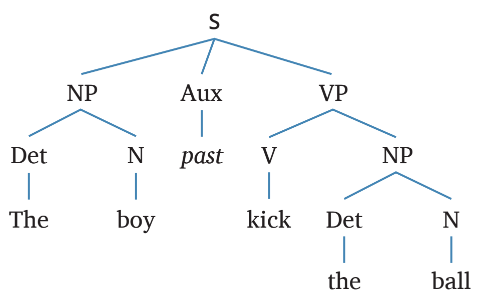
Passive sentences	The cat chased the mouse. → The mouse was chased by the cat.
***There* sentences**	A fly is in your soup. → There is a fly in your soup.
PP preposing	The astronomer saw a meteor with his telescope. → With his telescope the astronomer saw a meteor.

Next, we discuss two movement transformations. The first transformation applies to declarative sentences. It moves the tense specification in Aux so that it is an affix on the verb. Second, we investigate the transformation that turns declarative sentences into yes–no questions.

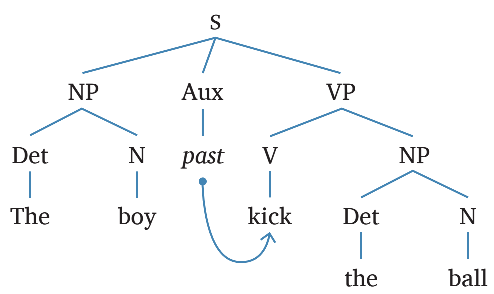
Tense movement

declarative sentence
A sentence that asserts that a particular situation exists; often contrasted with an interrogative sentence.

The first transformation that we illustrate turns the d-structure of a **declarative sentence** into an s-structure by moving the present- or past-tense feature onto the main verb. So far, in our basic structures for declarative sentences, we have indicated the tense feature in the Aux. However, the tense feature is not pronounced in this position in English; it needs to lower onto the main verb, as shown below:



d-structure



s-structure

Notice this transformation does not move an actual word or morpheme, only the specification or 'feature' for tense. Once the past-tense feature has lowered onto the verb *kick*, we have a derived PS tree. However, one more rule is needed to convert '*kick* + past' into the proper phonological form, written as *kicked*. Rules that convert the past- or present-tense specification into the proper phonological forms that we can pronounce are called **spell-out rules**. Spell-out rules apply to the final PS tree in a series if several transformations apply, that is, to the s-structure.

spell-out rules
Rules that convert abstract inflectional morphemes into pronounceable affixes in **s-structures**.

Aux movement

The transformational rule that forms yes–no questions takes the PS tree for a declarative sentence and transforms it into a yes–no question. A first approximation of the rule, which we can call the Aux-movement rule, can be stated as follows:

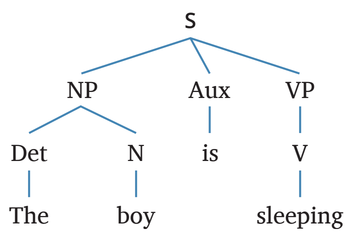
Move the auxiliary verb (Aux) to the left of the subject. (NF)

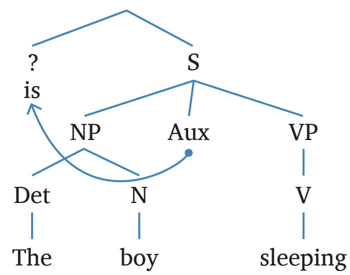
The diagram sketches the movement, which will be illustrated below in a hierarchical PS tree.

The boy is sleeping (declarative sentence)

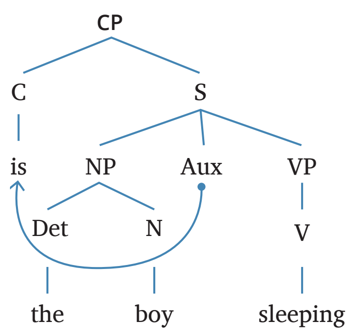
Is the boy ____sleeping (yes–no question)

However, when we use our PS rules to generate the PS tree for *The boy is sleeping*, we run into a problem. Where does the Aux move to? It needs to be higher in the PS tree than the subject NP (*the boy*) if it is to be pronounced to its left. But there is no position in our PS tree that is higher in the hierarchical structure than the subject NP, as shown in the tree on the right:





Earlier in our exploration of PS rules we discovered that there is a constituent that is higher than S in the hierarchical phrase structure – complementiser phrase (CP). The PS rule for CP (CP → C S) provided a position for the complementiser (*that*, *if* etc.) and a way to introduce S again into the phrase structure to generate an embedded sentence. Since CP is positioned higher than S in the phrase structure, we can take advantage of CP as a landing site for our Aux movement in the main clause as well. By convention, heads of phrases move to other head positions; here the head of S, Aux, moves to the head of CP, C.



We can now revise our Aux-movement rule to reflect the movement:

Move the auxiliary verb (Aux) to the C position. (NF)

This general rule now handles a whole range of declarative sentences, such as the ones that follow:

Samantha can speak four languages → Can Samantha speak four languages?

John is going bungee jumping in Queenstown → Is John going bungee jumping in Queenstown?

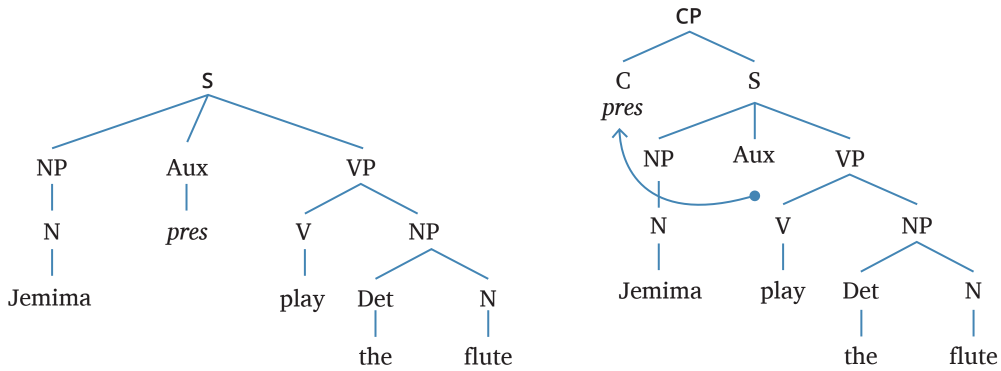
Mary has tried Pilates → Has Mary tried Pilates?

However, there are some declarative sentences for which our rule is problematic. The rule does not work for declarative sentences that do not contain an auxiliary verb or modal. The following examples illustrate the fact that declarative sentences containing only a main verb, but no auxiliary verb or modal, use the auxiliary verb *do* for yes–no questions:

Jemima plays the flute → Does Jemima play the flute?

Paul visited Uluru at sunrise → Did Paul visit Uluru at sunrise?

We know that *do* is not part of the d-structure of these yes–no questions. The d-structure contains a tense feature (past or present) in the Aux position since there is no auxiliary verb. So, even though there is no overt auxiliary verb in Aux, the past- or present-tense feature in Aux can be moved to the C position. This is shown in the following diagrams:



A second transformation called *do*-insertion then inserts the auxiliary verb *do* into the C position as a host for the tense feature. The past- or present-tense feature is then realised on *do*, and a spell-out rule ensures correct pronunciation as the appropriate phonological form of *do* (*does*, *did*, etc.). Our revised Aux-movement rule allows anything that is in Aux (present-/past-tense feature or an overt auxiliary verb or modal) to move to C:

Move Aux to C (F)

Universal Grammar principles and parameters

> Whenever the literary German dives into a sentence, that is the last you are going to see of him till he emerges on the other side of the Atlantic with his Verb in his mouth.
>
> Mark Twain, *A Connecticut Yankee in King Arthur's Court*, 1889

According to the theory of Universal Grammar, all languages of the world share many properties in common. Universal Grammar provides this basic design for human language, enabling children to acquire language quickly and relatively effortlessly. We have seen that all languages contain syntactic categories that can be merged together to form sentences, although the rules for this will vary across languages. In the theory of Universal Grammar, the kinds of structures and transformational rules that we hypothesise for our language are limited by constraints, also known as principles. The choices language learners make about properties of their language are made available by parameters. We discuss these in turn.

principles (constraints)
Restrict the application of a grammatical operation in a structure.

Principles

Principles, often called **constraints**, limit the hypotheses we come up with as language learners. We will look at two different principles: the principle of structure dependence and principles that constrain *wh*-movement. We will unpack movement transformation rules for both.

structure dependence
A principle of Universal Grammar that ensures language learners can only hypothesise transformational rules based on hierarchical properties of phrase structure trees, and not on linear sequences of words.

Structure dependence

The principle of **structure dependence** limits the kinds of hypotheses that language learners can entertain when trying to figure out the movement rules that apply in their particular language. The principle ensures that any hypotheses language learners come up with are restricted to those based on hierarchical structure and not those based on linear order. More generally, by constraining the hypotheses that learners can come up with, principles guide child language learners in their acquisition of language, reducing the possibility of error.

Movement transformations apply to elements in a PS tree without regard to the particular words that the structures contain; that is, transformations apply to constituents in hierarchical structures. They are not formulated based on the linear order of words.

Complex yes–no question formation

An example of structure dependence that has been the subject of much debate in linguistics and also other fields is the case of how children or language learners come up with a rule for asking yes–no questions, what has been termed the Aux-movement transformation. In the previous section, we considered several versions of this rule:

Move the auxiliary verb (Aux) to the left of the subject. (NF)

Move the auxiliary verb (Aux) to the C position. (NF)

Move Aux to C (F)

Notice that the first version of the rule is not strictly a rule that is dependent on hierarchical structure because it says to move the Aux to the 'left' of the subject. This suggests moving leftwards across words, rather than specifying which position the Aux should move to in the hierarchical structure. The second and third versions we contemplated above are both structure-dependent because they mention elements in the PS tree. However, any of the rules above would presumably get the right result for yes–no questions formed from simple sentences. It turns out that we need to be careful about how the rule is stated when more complex sentences are examined. Consider the following sentences:

The boy who is sleeping was dreaming.

Was the boy who is sleeping dreaming?

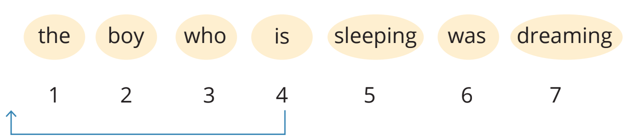
*Is the boy who sleeping was dreaming?

The boy who can sleep will dream.

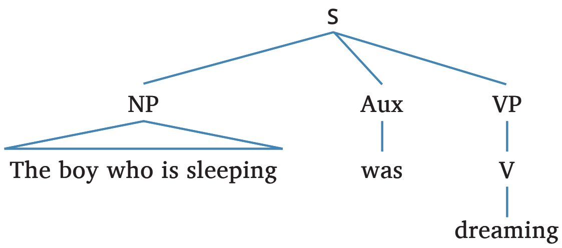
Will the boy who can sleep dream?

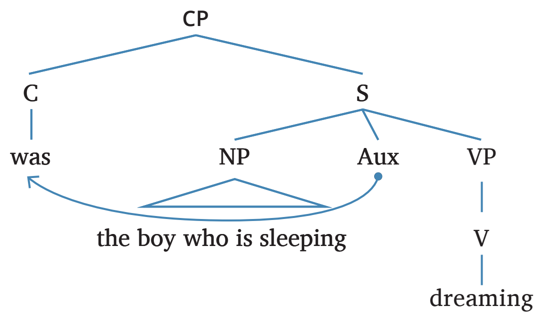
*Can the boy who sleep will dream?

In these sentences, the subject NP contains a relative clause (which is a CP). The subject NP of the first declarative sentence is *the boy who is sleeping* and the relative clause is *who is sleeping*. Notice that there is an auxiliary verb inside the NP subject, as well as one in the main clause of the sentence. So which Aux gets moved to the C position to form the yes–no question? This is what every child acquiring English must figure out. The grammatical and ungrammatical questions illustrate that it is the Aux of the S; that is, the one following the entire subject NP, that moves to C, not simply the *first* auxiliary in the sentence. If these sentences are viewed as a linear sequence of words, then it would make sense to move the first Aux that is encountered to C; this would be the Aux in the relative clause. If this Aux is moved, however, we would end up with an ungrammatical question (**Is the boy who sleeping was dreaming?*).



Instead, the rule takes the entire subject NP to be a constituent, and the rule applies to move the Aux in the main clause of the PS tree to C. This is illustrated in the following simplified PS trees where the triangle is used to signify the subject NP without giving details of its internal structure:

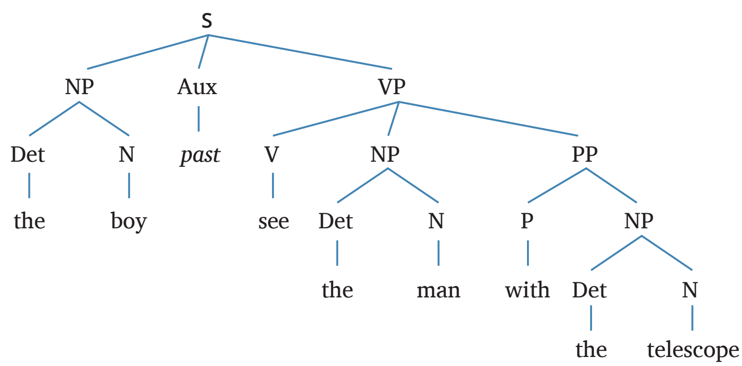


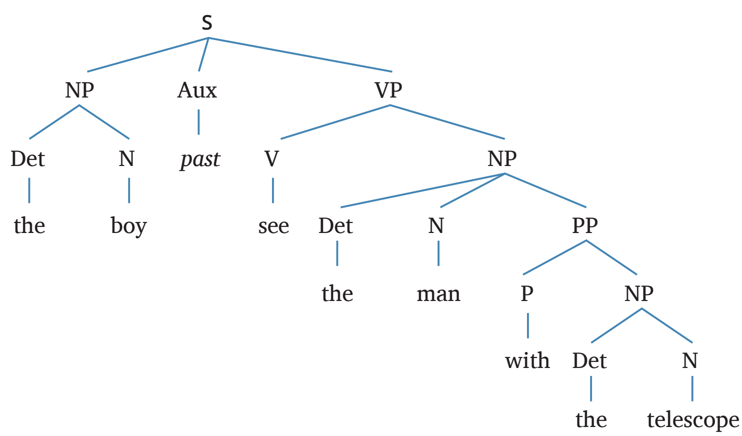


Once the sentence is represented as a PS tree, the hierarchical structure makes it easy to see which auxiliary verb should be moved. If we assume that children only come up with structure-dependent rules then we can assume that the only rule they would hypothesise would be ‘Move Aux to C’.

PP preposing and agreement

Structure dependence is a very general principle. The PP-preposing transformation gives us further evidence of structure dependence at work. Recall that the sentence *The boy saw the man with a telescope* is ambiguous because the PP can be attached in the VP (how the boy saw the man) or it can be attached inside the NP (the man had the telescope). However, once we prepose the PP to give *With the telescope, the boy saw the man*, the ambiguity disappears. It has only the first meaning corresponding to the phrase structure in which the PP is a separate constituent that is immediately dominated by the first VP shown in the section ‘Structural ambiguities’. The PP-preposing transformation does not move a PP that is part of a complement. (Recall that the NP *the man with the telescope* is a complement to the verb *saw*.) This is why the meaning in which the man had the telescope, as in the second tree, is ruled out.





Agreement rules are also structure dependent. In many languages, including English, the verb must agree with the subject. The verb (in English) has an *s* added whenever the subject is third-person singular. For other persons, the verb is unmarked and no morphological ending is added:

The guy seems kind of cute   The guys seem kind of cute

Now consider these sentences:

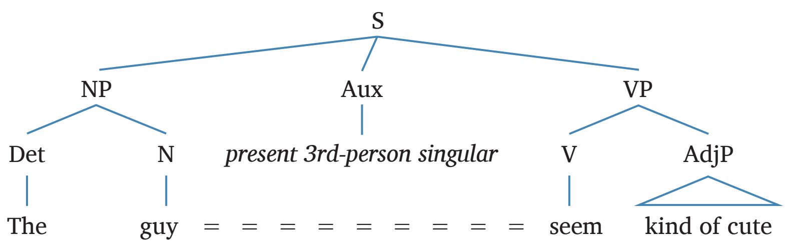
The guy we met at the party next door *seems* kind of cute.

The guys we met at the party next door *seem* kind of cute.

The verb *seem* must agree with the subject, *the guy* or *the guys*. Even though there are quite a few words between the head noun (*guy* or *guys*) and the verb, the verb always agrees with the head noun. Moreover, there is no limit to how many words may intervene, as the following sentence illustrates:

The guys (guy) we met at the party next door that lasted until 3 a.m. and was finally broken up by the cops who were called by the neighbours seem (seems) kind of cute.

Once again, it seems that we need to appeal to hierarchical structure in order to explain these facts. The PS tree of such a sentence explains this aspect of linguistic competence:



In the tree, '= = = = =' represents the intervening structure, which may, in principle, be indefinitely long and complex. Our innate linguistic competence tells us that agreement depends on the structure of the sentence, not the linear order of words. Agreement is between the subject and the **main verb**, where the subject is structurally defined as the NP immediately below the S, and the main verb is structurally defined as the verb in the VP. The agreement relation is mediated by Aux, which contains the tense and agreement features that match up the subject and the verb. Other intervening material can be ignored, as far as the rule of agreement is concerned, although in actual performance if the distance is too great the speaker may forget what the head noun was.

main verb
The verb that functions as the head in the highest verb phrase of a sentence.

In the theory of Universal Grammar, structure dependence is a universal principle that is proposed to be part of all human languages. For example, in languages that have subject–verb agreement, the dependency is between the verb and the head noun of the subject NP, and never some other noun, such as the closest one, as shown in the following examples from Italian, German, Swahili and English respectively (the third-person singular agreement morpheme is in boldface, the head noun is italicised and the closer noun is underlined):

La *madre* con tanti <u>figli</u> lavora molto.

Die *Mutter* mit vielen <u>Kindern</u> arbeitet viel.

Mama anao <u>watoto</u> wengi anajitahidi.

The *mother* with many <u>children</u> works a lot.

Wh-movement

We can also view the kind of movement seen in ***wh*-questions** (i.e. questions that contain a question word, such as *what*, *who*, *why*, *when*, *where*, *how* etc.) as being structure-dependent.

***wh*-questions**
Interrogative sentences beginning with one or more of the words *who(m)*, *what*, *where*, *when* and *how*, and their equivalents in languages that do not have *wh*-words.

Wh-questions are also derived from declarative sentences. Like yes–no questions, Aux moves to C and, in addition, the question word moves to the highest position in the PS tree. (We will not worry about what this position is in this text.)[3] Unlike the other rules we have seen, which operate inside a phrase or clause, - movement of question words, that is *wh*-movement, can move the ***wh*-phrase** outside its own clause. In fact there is no limit to the distance that a *wh*-phrase can move, as illustrated by the following sentences. The dashes indicate the position from which the *wh*-phrase has been moved.

***wh*-phrase**
Can refer to a single *wh*-word or a more complex *wh*-phrase, such as *how many boys*, *whose hat* etc.

Who did Helen say the club wanted to hire ___?

Who did Helen say the club wanted the committee to try to hire ___?

Who did Helen say the club wanted the committee to try to convince the local council to get the mayor to hire ___?

Such 'long-distance' dependencies created by *wh*-movement are a fundamental part of human language. They provide further evidence that sentences are not simply strings of words. These trees express the underlying structure of the sentence as well as their relation to other sentences in the language.

We have already seen that structure dependence is a principle that constrains the kinds of rules or transformations that learners might hypothesise. Yes–no questions must obey the principle of structure-dependence and it is also the case that *wh*-movement must obey principles of Universal Grammar. Although a *wh*-phrase, such as *what*, *who* or *which boy*, can be inserted into any NP position, and is then free in principle to move higher in the phrase structure, there are specific instances in which *wh*-movement is blocked. For example, the rule cannot move a *wh*-phrase out of a relative clause such as *… the club that wants to hire whom* as in (4b) that follows, or a clause beginning with *whether* or *if* as in (5c) and (5d). (Remember, the positions from which the *wh*-phrases have been moved are indicated with a space '____'.)

4 a Helen paid a visit to the club that wants to hire whom?
  b *Whom did Helen pay a visit to the club that wants to hire ___?
5 a Miss Marple asked Sherlock whether Poirot had solved the crime.
  b Whom did Miss Marple ask ___ whether Poirot had solved the crime?
  c *Whom did Miss Marple ask Sherlock whether ___ had solved the crime?
  d *What did Miss Marple ask Sherlock whether Poirot had solved ___?

The only difference between the grammatical (5b) and the ungrammatical (5c) and (5d) is that in the former case the *wh*-phrase originates in the higher clause, whereas in the latter cases the *wh*-phrase comes from inside the *whether* clause. This illustrates that the principle against movement depends on structure and not on the length of the sentence.

In fact some sentences can be very short and still not allow *wh*-movement:

6 a Tom dislikes his neighbour's wife.
  b Whom does Tom dislike?
  c Whose wife does Tom dislike?
  d *Whose does Tom dislike wife?
7 a John ate sausages and mash.
  b John ate sausages with mash.
  c *What did John eat sausages and?
  d What did John eat sausages with?

The sentences in list (6) show that a *wh*-phrase cannot be extracted from inside a possessive NP. In (6b) it is of course okay to question the whole direct object and prepose the *wh*-word. In (6c) it is even okay to question a piece of the possessive NP, providing the entire *wh*-phrase is moved. But (6d) shows that it is not permitted to move the *wh*-word alone out of the possessive NP.

Sentence (7a) is a coordinate structure and has approximately the same meaning as (7b), which is not a coordinate structure. In (7c) moving a *wh*-word out of the coordinate structure results in ungrammaticality, whereas in (7d) it is okay to move the *wh*-word out of the PP. The ungrammaticality of (7c), then, is related to its structure and not to its meaning.

The constraints on *wh*-movement are considered to be universal principles and not specific to English. Such principles operate in all languages that have *wh*-movement. The principles are part of the linguistic knowledge that the child brings to the task of acquiring their specific language. The principles are in place to guide children so that they acquire their language rapidly with minimal errors.

Parameters

Universal Grammar also needs to account for the rich diversity observed across the languages of the world. There are many shared properties, but also differences between languages that must be explained. In Universal Grammar, differences across languages are explained by a system of **parameters**. Parameters are 'either–or' choices that learners make for a range of language properties. To get the idea, consider the following metaphor. Imagine a new housing estate in which all of the houses have the same floor plan but the occupants have some choices to make. They can have carpet or hardwood floors and curtains or blinds; and they can choose their kitchen cabinets and benchtops, bathroom tiles and so on. The 'either–or' choices (carpets or hardwood floors) can be likened to the parameters of Universal Grammar. The idea is that the language learner listens to the language input from speakers of their language and decides which of the two choices is instantiated in their local language. On the basis of this language input, they make a decision and 'set' the parameter. Of course, when it is said that child language learners 'decide' which choice matches the input, it must be remembered that this is not a conscious decision, but rather one that is made subconsciously. In this chapter, we will look at two key parameters.

parameter
One of a small set of alternatives for a particular phenomenon made available by **Universal Grammar**. Universal Grammar specifies, for example, that a phrase must have a **head** and possibly **complements**; a parameter states whether the complement(s) precede(s) or follow(s) the head.

The head parameter

One example of a parameter is the **head parameter**. As we have seen, all languages have PS rules. However, languages may have different word orders within the PS rule. Universal Grammar specifies the structure of a phrase. It must have a head and may take one or more complements. The choice that language learners make is whether to have heads precede their complements or complements precede their heads. English is a language in which the head precedes the complement; this means that the verb precedes the object NP, prepositions precede the complement NP and so on. Turkish and Japanese, on the other hand, are languages in which the head follows the complement. This is why Turkish and Japanese are SOV languages, and do not have SVO word order, like English. Child language learners have to listen to the input and decide on the order of head and complement in their language.

head parameter
The parameter that provides language learners with a binary 'menu' option, for the head of a phrase to either precede or follow its complement.

Consider the example from Japanese below. For the sentence *Taro found a dog*, our English translation has the verb *found* preceding the direct object *a dog*. However, in the Japanese sentence, the direct object *inu-o* precedes the verb *mituketa*. Likewise, the head–complement order of the PP is reversed also. In the English *on the chair*, the P precedes the complement NP, while the Japanese order is *isu-ni*, in which the word for chair is followed by the **particle** *ni*, which can be translated as 'on'.

particle
In Japanese, a morpheme that generally follows a noun and expresses grammatical functions such as topic, subject of sentence, object of sentence, location, etc.

Taro-ga	inu-o	mituketa		
Taro-subject	dog-object	found		(Taro found a dog)
Taro-ga	inu-o	isu-ni	oita	
Taro-subject	dog-object	chair-on	put	(Taro put the dog on the chair)

The *wh*-parameter

***wh*-parameter**

The parameter that gives language learners the binary option of moving *wh*-phrases to the highest hierarchical position in a structure or leaving them in an unmoved position in the sentence.

Another parameter that has been proposed is the ***wh*-parameter**. This parameter governs the form of *wh*-questions. As discussed earlier, the term *wh*-question refers to questions in English beginning with *wh*-phrases, such as *who*, *what*, *where* etc., but it is also used as the general term for this kind of question in all languages of the world. Even if the question words do not always begin with *wh*, they are referred to as *wh*-questions. In English, *wh*-phrases move by a transformation to the highest position in the phrase structure, and are pronounced in initial position:

What did Harry eat ___ at the restaurant?

Where will the child put the puppy ___?

Who has Marcel recruited ___ to teach the class?

In each of the examples, the original position of the *wh*-phrase is shown with a '___'. We know from selection properties of the verbs that the question word originated in the position shown by the dash. The verb *eat*, for example, selects a direct object complement on its usual reading, but there is no NP after *eat*. This suggests that *what* was positioned in the direct object position before it moved. Many languages are like English in moving *wh*-phrases to initial position; Romance languages, such as Spanish and Italian, and Germanic languages, such as German, Dutch and Norwegian, are all like English in this respect. However, there is another set of languages, including Japanese, Swahili and Mandarin Chinese, in which the *wh*-phrase does not move. In Japanese, the sentence is marked with a question morpheme *no*. Recall that Japanese word order is SOV, so the *wh*-phrase *nani*, 'what', is an object and occurs before the verb. It has not moved to the highest position in the hierarchical structure.

Taro-ga	nani-o	mituketa-no?
Taro-subject	what-object	found-question particle
'What did Taro find?'		

In Swahili, the *wh*-phrase – *nani*, by pure coincidence – does not move either:

Ulipatia	nani	kitabu?
You gave	who	a book?

The *wh*-parameter captures the variation observed across languages in whether *wh*-phrases move or not. Language learners listen to the language that surrounds them and decide which setting is appropriate for the language of their environment.

Universal Grammar in action: sign-language syntax

Sign languages are natural languages. Like any other language, they have PS rules that provide hierarchical structure and order constraints. And, like other natural languages in the spoken modality, their syntactic structure is guided by Universal Grammar principles and parameters.

The rules of syntax differ across sign languages, just as the rules differ across spoken languages. Auslan, the sign language used in Australia, and New Zealand Sign Language are both derived from British sign language and have similarities. American Sign Language (ASL), on the other hand, was originally derived from French Sign Language and is quite different. The rules of a particular sign language will order the constituents, just as in English, for example. A signer may distinguish *dog bites man* from *man bites dog* through the order of signing, or from the spatial relationship between the signs. In Auslan, the basic word order is SVO, which is like English word order. Unlike English, however, adjectives follow the head noun in Auslan.

Many languages have a transformation that 'preposes' or moves a direct object to the beginning of the sentence to draw particular attention to it. We can do this in English as well, and we did this in our constituency tests. In English, structures with preposing, while grammatical, are not commonly used:

Hypocrisy we detest.

The transformation is called **topicalisation** because an object to which attention is drawn generally becomes the topic of the sentence or conversation. (The sentence before movement is *We detest hypocrisy*.) In Auslan, a similar reordering of signs accomplishes the same effect, accompanied by raising the eyebrows, holding the last sign of the topic momentarily, and pausing and returning to a neutral facial expression before signing the comment. The head motion and facial expressions of a signer function as markers of the special word order, much as intonation does in English, or the attachment of prefixes or suffixes might in other languages.

topicalisation
A transformation that moves a syntactic element to the front of a sentence.

There are constraints on topicalisation similar to those on *wh*-movement illustrated in the previous section. The first example that follows, taken from English, illustrates what we learnt from constituency tests – that only constituents can be preposed and topicalised. The second example shows that we cannot topicalise an NP by moving it out of a 'whether' clause. And finally the third example shows that it is not possible to move one member out of a conjunction:

*Wife, Tom dislikes his neighbour's.

*This film, John asked Mary whether she liked.

*Mash, John ate sausages and for lunch.

Compare this with the grammatical:

His neighbour's wife Tom dislikes.

This film John asked Mary to see with him.

Sausages and mash John ate for lunch.

Sign languages exhibit similar constraints on movement, although Auslan has a greater degree of word order flexibility than English. Auslan and other sign languages show an interaction of universal and language-specific properties, just as spoken languages do. The grammatical rules of sign languages are structure dependent, and movement rules are constrained in various ways, as illustrated above. Other aspects are particular to sign languages, such as the facial gestures, which are part of the grammar of sign languages but not of spoken languages.

As in topicalisation, questions are accompanied by a non-manual marker; that is, movement of the eyebrows from their neutral position. For yes–no questions, the eyebrows are usually raised, the eyes opened wide and the head tilted forward. For *wh*-questions, Auslan uses a range of question signs similar to English *wh*-words (*where*, *when*, *why*, *how* and *what*), often accompanied by lowering of the eyebrows. Non-manual markers are thus an integral part of the grammar of Auslan, much like intonation in spoken languages. A sentence or phrase may be negated by shaking the head while it is being signed. Non-manual markers may be combined, as in a combination of head-shaking and facial expression to produce a negative question.

The study of sign languages offers important insights about language. The fact that the principles and parameters of Universal Grammar hold in both the spoken and manual modalities shows that the human brain is designed to acquire and use language, not simply speech.

CHAPTER REVIEW

Summary

Speakers of a language recognise the grammatical sentences of their language and know how the words in a sentence must be ordered and grouped to convey a certain meaning. All speakers are capable of producing and understanding an unlimited number of new sentences never spoken or heard before. They also recognise ambiguities, know when different sentences mean the same thing, and correctly perceive the grammatical relations in a sentence, such as subject and direct object. This kind of knowledge comes from their innate knowledge of the rules of syntax.

Sentences have structure that can be represented by PS trees containing syntactic categories. PS trees reflect the speaker's mental representation of sentences. Ambiguous sentences may have more than one PS tree.

As discussed in Chapter 4, the lexicon represents the knowledge that speakers have about the vocabulary of their language. This knowledge includes c-selection, the principle that different verbs 'select' different complements, and the knowledge that this principle is implemented in the syntactic component of the grammar.

There are different kinds of syntactic categories: lexical categories, such as N and V; and functional categories, such as Det, Aux and C. The lexical categories all have a phrasal counterpart, such as NP or VP. Some functional categories have a phrasal counterpart; the phrasal counterpart of Aux is S, and the phrasal counterpart of C is CP; Det and Conj do not have a phrasal counterpart in this system. The internal structure of the phrasal categories is universal. It consists of a head and its complements. The particular order of elements within the phrase is accounted for by the PS rules of each language.

PS trees show the hierarchical structure of the sentence and reveal the constituency of each syntactic phrase in the sentence. We need to represent sentences as hierarchical structures in order to explain complex facts about the language, such as ambiguity. It is difficult to explain why certain sentences are ambiguous if sentences are viewed as linear sequences of words. PS trees give us some linear information also, such as the pronunciation order of the words, which can be read off the PS tree from left to right.

In some PS rules, syntactic categories that appear on the left side of the PS rule may also occur on the right side. Such rules are recursive rules, and allow the same syntactic category to appear repeatedly in a PS tree, such as when one sentence is embedded in another sentence (which is embedded in another sentence and so on). Recursion is claimed to be a property that differentiates human languages from other communication systems.

A grammar is a formally stated explicit description of the mental grammar or of a speaker's linguistic competence. It can be represented, in part, by the PS rules. PS rules characterise the basic PS trees of the language, the d-structures. Transformational rules account for relationships between sentences, such as declarative and yes–no questions or *wh*-questions. Transformations can move constituents or insert function words, such as *do*, into a sentence. The output of the transformational rules are s-structures, the structures to which the phonological spell-out rules of the language apply.

The basic design of language is universal. Universal Grammar incorporates universal constraints or principles that limit the syntactic representations that can be generated, and the kinds of transformational rules that speakers hypothesise. One principle ensures that syntactic rules are structure dependent (and not dependent on linear sequences of words, for example). These principles or constraints exist in all languages – spoken and signed – as part of Universal Grammar and need not be learnt. Universal Grammar also contains parameters of variation. Parameters account for the diversity in natural languages. They permit variation in basic properties, such as the order of heads and complements, and whether *wh*-questions have the question word moved or not. A child acquiring a language must 'set' the parameters of Universal Grammar for the particular language of their environment.

Exercises

1 Besides distinguishing grammatical from ungrammatical strings, the rules of syntax account for other kinds of linguistic knowledge, such as:
  a when a sentence is structurally ambiguous (e.g. *The boy saw the man with a telescope*)
  b when two sentences of different structure mean the same thing (e.g. *The father wept silently* and *The father silently wept*)
  c when two sentences of different structure and meaning are nonetheless structurally related, such as declarative sentences and their corresponding interrogative form (e.g. *The boy can sleep* and *Can the boy sleep?*).

  In each case, draw on your linguistic knowledge of English to provide an example different from the ones in the chapter, and explain why your example illustrates the point. If you know a language other than English, provide examples in that language, if possible.

2 Consider the following sentences:
  a I hate war.
  b You know that I hate war.
  c He knows that you know that I hate war.

  i Write another sentence that includes sentence (c).
  ii What does this set of sentences reveal about the nature of language?
  iii How is this characteristic of human language related to the difference between linguistic competence and performance? (*Hint:* Review these concepts in Chapter 1.)

3 Paraphrase each of the following sentences in two ways to show that you understand the ambiguity involved.
Example: Smoking grass can be nauseating.
Putting grass in a pipe and smoking it can make you sick.
Fumes from smouldering grass can make you sick.
  a Dick finally decided on the boat.
  b The professor's appointment was shocking.
  c The design has big squares and circles.
  d That sheepdog is too hairy to eat.
  e Could this be the invisible man's hair tonic?
  f The premier is a dirty street fighter.
  g I cannot recommend him too highly.
  h Terry loves his wife and so do I.
  i They said she would go yesterday.
  j No smoking section available.

4 Consider the following ambiguous sentence and illustrate what the two different constituent structures would be. Support your answer using the constituency tests.
The firefighters evacuated six billionaires from Silicon Valley.

5 Draw the trees for the italicised NPs in the following sentences:
  a *Freedom of the press* is critical for democracy.
  b *Early mornings* are not my forte.
  c It is awful to see *photos of burnt koalas*.
  d I start the morning with *several strong cups of coffee*.
  e *Protesters* threw bricks at the police.
  f *Every cup and every saucer* shattered in the earthquake.
  g *Three major floods in five days* hit Venice.
  h Refugees from Africa have gone through *extremely tough times.*

6 Using the PS rule for VP in the summary, draw the trees for italicised VPs in the following sentences. Remember that you need the bare form of the verb.
  a The former US President *often eats Big Macs*.
  b Doctors say that obesity *is a serious concern*.
  c I *feel excited*.

- d Turmeric *is the new superfood*.
- e I *always take my medication after breakfast and before bed*.
- f Ariana Grande *cancelled her performance in Kentucky*.
- g Dietitians *suggest that their clients should avoid sugary cereals*.

7 Following the PS rules in the summary table, draw phrase structure trees for the following sentences. You may need to use the Aux-movement rule.

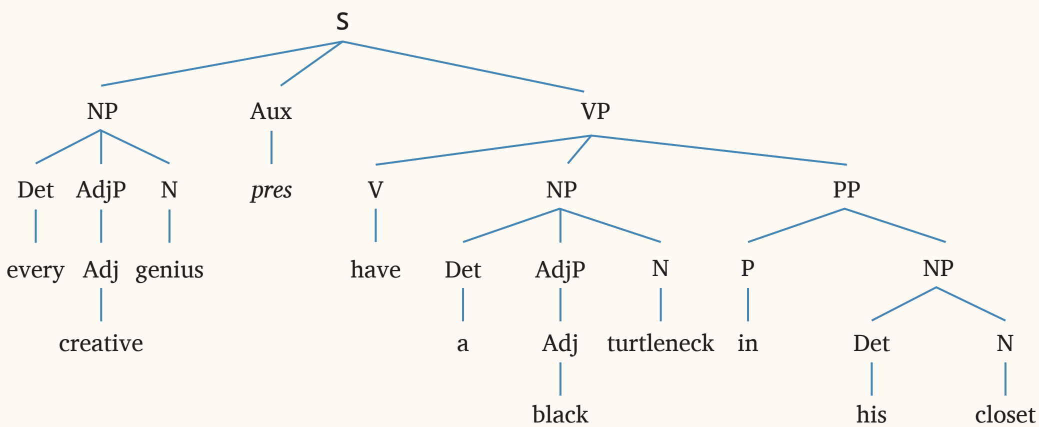
- a Can you refuse an invitation from your boss?
- b Netflix is extremely popular in Australia and New Zealand.
- c The government will provide help for victims of the attack eventually.
- d The locals rescued the small elephant from a hole with an excavator.
- e Recent press releases suggest that vaping can damage your lungs. (*Treat 'press release' as a single noun*.)
- f The Duchess visited a hospice for severely ill children.

Challenge exercises:

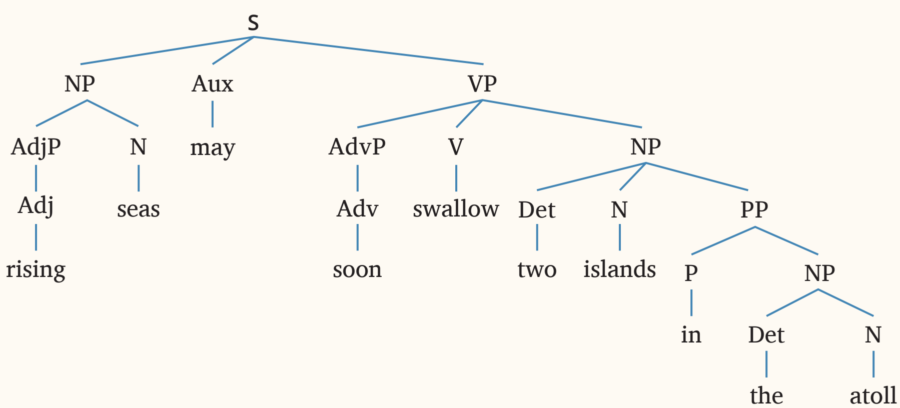
- g My sister travelled to a tattoo studio in Melbourne with a good reputation. (*Treat 'tattoo studio' as a single noun*.)
- h David Attenborough says that he appreciates his friendship with the Queen.
- i Doria distributed blankets to fire victims in California. (Treat 'fire victims' as a single noun.)
- j The flight from Perth to London takes seventeen hours.
- k E-scooters are popular but dangerous.

8 Write the PS rules that are needed to generate each of the following phrase structure trees. In each case, use only those parts of the PS rules in **Table 5.12** that are required; for example, if the VP in the sentence is *eat beans* then you only need to use the VP → V NP part of the larger VP rule. Use parentheses in your rules if necessary; for example, if you have two NPs in your sentence, and one of them has a determiner and the other does not, then you would need to use NP → (Det) N as your NP rule.

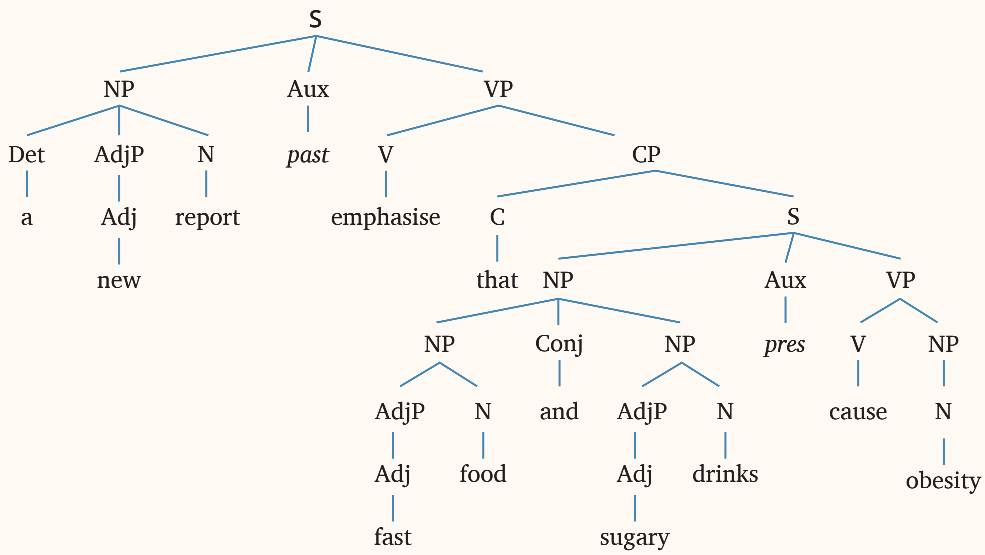
- a Every creative genius has a black turtleneck in their closet.



- b Rising seas may soon swallow two islands in the atoll.



c A new report emphasised that fast food and sugary drinks cause obesity.



9 In all languages, sentences can occur within sentences. In exercise (2), for example, sentence (b) contains sentence (a) and sentence (c) contains sentence (b). Put another way, sentence (a) is embedded in sentence (b) and sentence (b) is embedded in sentence (c). Sometimes embedded sentences appear slightly changed from their 'normal' form. In the examples that follow, underline any sentence or clause that is not the main clause of the sentence. Embedded sentences (clauses) are not necessarily embedded underneath another sentence. Remember also that embedded sentences do not always have tense. In the sentences from other languages below, underline the non-English sentence, not the translation. The embedded clause is underlined in (a) as an example.

a Yesterday I noticed <u>my accountant repairing the toilet</u>.
b The vice-chancellor announced that the university was in financial trouble.
c I am upset to see how many students are late to class.
d It is thought that COVID-19 may have come from bats.
e Who promised the teacher that Maxine would not be absent?
f After months of protesting and unrest, Hong Kong's tourism industry is suffering.
g I hear that donkey burgers are undeniably popular in Beijing.
h The woman who turned 107 years-old will share her secret on TV.
i While wearing a mask, Maria applied her eyeshadow.
j I donated my long hair to the charity that makes wigs for cancer patients.
k All of our classes were face-to-face before the virus hit the world.
l A scientist suggested a germ-free childhood could potentially trigger leukaemia.
m Khǎw chyâ wǎa khruu maa. (Thai)

He believe that teacher come
He believes that the teacher is coming.

n Je me demande quand il partira. (French)

I me ask when he will leave
I wonder when he'll leave.

o Jan zei dat Piet dit boek niet heeft gelezen. (Dutch)

Jan said that Piet this book not has read
Jan said that Piet has not read this book.

10 Draw two phrase structure trees representing the two meanings of the sentence *The chef threatened the apprentice with an eggbeater*. Be sure you indicate which meaning goes with which tree.

11 Use the rules in **Table 5.12** to create five phrase structure trees of sentences not given in the chapter of six, seven, eight, nine and ten words. Use your mental lexicon to fill in the bottom of the tree.

12 Ideally the rules of syntax specify all and only the grammatical sentences of the language. Why is it important to say 'only'? What would be wrong with a grammar that specified as grammatical sentences all of the truly grammatical ones plus a few that were not grammatical?

13 Using one or more of the constituency tests discussed in the chapter e.g. (stand-alone test, move as a unit, replacement by a pro-form), determine which italic portions in these sentences are constituents. Provide the grammatical category of the constituents.

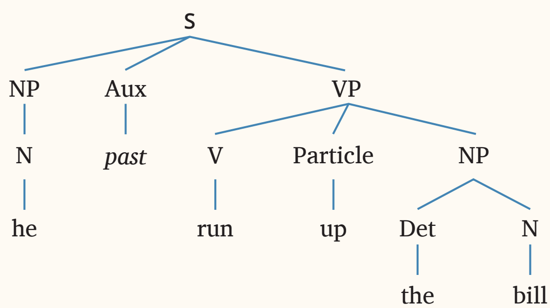
a Susie ate *a plant-based burger* for lunch.
b The measles outbreak *in Auckland* worried a lot of people.
c I expect *that medical marijuana will become widespread*.
d Melissa didn't really like *the nurses on the morning shift*.
e *Pete and Max* are fighting over who gets the car on Sunday.

14 The two sentences below contain a *verbal particle*; a word identical in form to a preposition that, when paired with a verb, has a particular meaning. A particle, as opposed to a preposition, is characterised syntactically by its ability to occur next to the verb, or moved to the right, as follows:

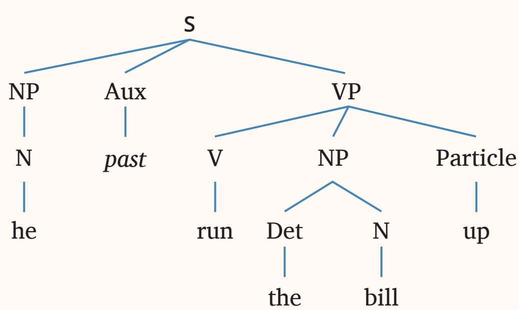
He ran *up* the bill.
He ran the bill *up*.

The verbal particle *up* and the verb *run* depend on each other for the unique meaning of the phrasal verb *run up*. We know this because *run up* has a meaning different from *run in* or *look up*.

These example sentences have the same d-structure. Note that the list of PS rules presented in the chapter did not include a rule that would generate the trees incorporating a particle as follows:



The s-structure of 'He ran the bill *up*', however, illustrates a discontinuous dependency. The verb is separated from its particle by the direct object NP.



A particle movement transformation derives this s-structure from the d-structure generated by the PS rules.

- a Explain why the particle movement transformation would not derive **He ran the bill up* from the d-structure *He ran up the bill*.
- b Many of the transformations encountered in this chapter are optional. Whether they apply or not, the ultimate s-structure is grammatical. This is true of the particle movement transformation in most cases, but there is one condition under which the particle movement transformation is obligatory; that is, failure to apply the rule will lead to ungrammatical results. What is that condition? (This exercise may require native English competency.)

15 Think about selectional restrictions (c-selection) and explain why the following are ungrammatical.
- a *The horticulturist placed the flowers.
- b *The prime minister wanted that the government would pass a new bill.
- c *The Dean is delighted of the grant success.
- d *The leaves fell the trees.
- e *The children arrived the station.

16 In the chapter, we considered only transitive verbs, ones that select an NP direct object, such as *chase*. English also has *ditransitive verbs* (i.e. a verb that appears to take two noun phrase objects), ones that may be followed by two NPs. Ditransitive verb phrases often have an alternative form with a prepositional phrase in place of the first noun phrase. The system of PS rules presented in the chapter does not accommodate these sentences, but it is useful to recognise that they exist. Here is an example with *give*:

The lecturer gave students an assignment.

Think of three other ditransitive verbs in English and give example sentences.

17 Aboriginal English has some features that differ from what is often called 'Standard English'. What differences do you see in the syntax of the examples below?[4]

	Aboriginal English	Standard English
a	I can't see that man car	I can't see the [or that] man's car
	Where Tom house?	Where is Tom's house?
b	This a ard one	This is a hard one
	E in ospital	He's in hospital

18 In Singapore English, *wh*-questions can be asked as follows. Explain how the syntax of these *wh*-questions differ from Standard English.[5]
- a How much it will be?
- b What the cruise is like?

19 Tamil is a language spoken in India. The following are word-for-word translations of some Tamil PPs.

Tamil-to-English	meaning
the bed on	on the bed
the village from	from the village

- a Based on these data, is Tamil a language that has set the head parameter to head initial or head final?
- b What would the PS tree for a Tamil PP look like?

20 Consider the following sentences containing the nonsense verb *glunk*:
- a Harry glunks his dog on the weekend.
- b Harry glunked his girlfriend in the car.
- c Harry might glunk his dog.
- d *Harry is glunking in the car.
- e *Harry glunked the car on the weekend.
- f *Harry can glunk.

Examine the sentences above and determine if *glunk* takes an obligatory complement, and if so, which phrases are optional adjuncts. What are the selectional restrictions (s-selection) on the NP following *glunk*: must it be human, non-human or animate, or is it unrestricted?

21 All of the *wh*-phrases can move to the left periphery (edge) of the sentence. Invent three sentences beginning with *what*, *which* and *where* in which the *wh*-word is not in the position in which it is first generated using PS rules. Give both the d-structure and s-structure versions of your sentence. Here is an example with the *wh*-word *when*: *When could Mary catch a flight out of here?* from *Mary could catch a flight out of here when?*

22 There are many systematic, structure-dependent relationships among sentences similar to the one between declarative and interrogative sentences discussed in this chapter. Here is another example, based on ditransitive verbs (see exercise 16):

The boy wrote the senator a letter.
The boy wrote a letter to the senator.
A philanthropist gave the Animal Rights movement $1 million.
A philanthropist gave $1 million to the Animal Rights movement.

a Describe the relationship between the first and second members of the pairs of sentences.
b State why a transformation deriving one of these structures from the other is plausible.

23 State at least three differences between English and the following languages, using just the sentence(s) given. Ignore lexical differences – that is, the different vocabulary. Here is an example for Thai:

Dèg	Khon	n'i	kamlang	kin.
Boy	*Classifier*	this	*progressive*	eat

This boy is eating.

Măa	Tua	Nán	kin	khâaw.
Dog	*Classifier*	That	eat	rice

That dog ate rice.

Three differences are: (1) Thai has classifiers, which have no English equivalent; (2) the words (determiners, actually) *this* and *that* follow the noun in Thai, but precede the noun in English; (3) the progressive is expressed by a separate word in Thai and the verb does not change form. In English, the progressive is indicated by the presence of the verb *be* and the adding of *-ing* to the verb.

a French:

Cet	*homme*	*intelligent*	*comprendra*	*la question.*
This	man	intelligent	will understand	the question

This intelligent man will understand the question.

Ces	*hommes*	*intelligents*	*comprendront*	*les questions.*
These	men	intelligent	will understand	the questions

These intelligent men will understand the questions.

b Japanese:

Watashi	Ga	sakana	o	tabete	iru.
I	*subject marker*	Fish	*object marker*	eat(*ing*)	am

I am eating fish.

c Swahili:

Mtoto		Alivunja			kikombe.	
m-	toto	a-	li-	vunja	ki-	kombe
classmarker	child	He	*past*	break	*classmarker*	cup

The child broke the cup.

Watoto		wanavunja			vikombe.	
wa-	toto	wa-	na-	vunja	vi-	kombe
classmarker	child	They	*present*	break	*classmarker*	cup

The children break the cups.

d Korean:

Kɨ	sonyɔn-iee		wɨyu-lɨl		masi-ass-ta.	
kɨ	sonyɔn-	lee	wɨyu-	lɨl	masi-ass-	ta
The	boy	*subject marker*	Milk	*object marker*	drink	*past assertion*

The boy drank milk.

Kɨ-nɨn		muɔs-ɨl		mɔk-ass-nɨnya.		
kɨ-	nɨn	muɔs-	ɨl	mɔk-	ass-	nɨnya
He	*subject marker*	What	*object marker*	eat	*past*	*question*

What did he eat?

e Tagalog

Nakita	ni	Pedro-ng		puno	na	ang	bus.
Nakita	ni	Pedro	-ng	puno	na	ang	bus
Saw	*article*	Pedro	that	full	already	*topicmarker*	bus

Pedro saw that the bus was already full.

24 Transformations may delete elements, as in the following 'elliptical' sentences:

a Mary will study hard for the exam and John will too.

b John wrote a letter to someone, but I don't know who.

c John loves carrots and Mary broccoli.

i Identify the omitted constituent in each of the examples above. (*Hint*: do this by providing the d-structure for each sentence.)

ii Provide three more examples of each kind of 'ellipsis' illustrated above.

d **Challenge exercise:** Consult a speaker of another language and determine whether this language has the same kinds of ellipsis as English does, or other kinds. (If you know another language you can use your own intuitions to answer this question.)

25 **Challenge exercise:** It is not always straightforward to distinguish adjuncts from complements. 'One-replacement' provides a test: only nouns with adjunct modifiers can be substituted for by <u>one</u>, as in *a patient with a broken arm and* one *with a broken leg* (adjunct), but nouns with true complements do not allow *one* replacement, so that **a patient of the doctor and one of the chiropractor* is not well-formed. Here are four examples of complements and four of adjuncts. Apply the *one*-replacement test to determine which is which.

a the man with the golden arm

b a voter for proposition eighteen

c my cousin's arrival at his home

d the construction of a retaining wall

e the boat in the river

f the ocean white with foam

g the desecration of the temple

h the betrayal of Julius Caesar.

Further reading

Akmajian, A, Farmer, A, Bickmore, L, Demers, R A and Harnish, R M 2017, *Linguistics: An introduction to language and communication*, 7th edn, MIT Press, Cambridge, MA.

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—— 1997, *Syntax: A minimalist introduction*, Cambridge University Press, Cambridge, UK.

Tallerman, M 2019, *Understanding syntax*, 5th edn, Routledge, Abingdon, UK.

Weblinks

- https://www.oxfordbibliographies.com/page/144 – This website has been recently launched to provide resources for students.
- https://www.linguisticsociety.org – The Linguistic Society of America website is a source of information about linguistics and also houses a series of FAQ pamphlets on various aspects of language.
- https://aiatsis.gov.au/languages-aiatsis – This website has a wealth of information about indigenous Australian languages.
- https://wals.info – The World Atlas of Language Structures (WALS) is a large database of properties of languages.
- https://languagelog.ldc.upenn.edu/nll – A blog run by linguistics at the University of Pennsylvania.
- https://www.superlinguo.com – A blog about language and linguistics by La Trobe University lecturer Lauren Gawne.

Endnotes

1 Fodor, J and Bever, T 1965, 'The psychological reality of linguistic segments', *Journal of Verbal Learning and Verbal Behavior*, 4: 414–420.

2 The system of phrase structure used in this chapter is largely based upon Carnie, A 2013, *Syntax: A generative introduction*, 3rd edn, Wiley-Blackwell, Malden, MA.

3 For ease of exposition, we have presented CP with only one position to accommodate moved constituents. In fact, CP may have two positions, one for *wh* and one for the Aux.

4 These examples are taken from Eades, D 2013, *Aboriginal ways of using English*, Aboriginal Studies Press, Canberra, ACT.

5 These data are from Leimgruber, J 2011, 'Singapore English'. *Language and Linguistics Compass* 5(1): 47–62.

6

Semantics and pragmatics: the meanings of language

> Language without meaning is meaningless.
>
> Roman Jakobson (1896–1982)

Learning objectives

After reading Chapter 6, you should be able to:

- understand basic semantic concepts of truth, entailment and ambiguity
- understand the semantic rules that combine the meanings of words into meaningful phrases and sentences, and the exceptions to these rules
- know the major types of lexical relations, including polysemy, synonymy, homonymy and metonymy
- identify major thematic roles
- understand the properties of pronouns and other deictic words
- know the role of maxims of conversation (cooperative principles) in linguistic interaction
- explain the relationship between language and thought and the extent to which language can influence thought.

For thousands of years philosophers have pondered the meaning of *meaning*, yet speakers of a language can easily understand what is said to them and can produce strings of words that are meaningful to other speakers. We use language to convey information to others (*My new bike is pink*), ask questions (*Who left the party early?*), give commands (*Stop lying!*) and express wishes (*May there be peace on Earth*).

What do you know about meaning when you know a language? The answer is: an awful lot. To begin with, you know when a word is meaningful (*flick*) or meaningless (*blick*), and you know when a sentence is meaningful (*Jack swims*) or meaningless (*swims metaphorical every*). You know when a word is ambiguous (*bear*) and when a sentence is ambiguous (*Jack saw a man with a telescope*; see Chapter 5). You know when two words are synonymous and have essentially the same meaning (*sofa* and *couch*), and when two sentences have the same meaning (*Jack put off the meeting*, *Jack put the meeting off*). And you know when words or sentences have opposite meanings (*alive/dead*, *Jack swims/Jack doesn't swim*).

You generally know the real-world object that words refer to (*the chair in the corner*); and even if the words do not refer to an actual object (*the unicorn behind the bush*), you still have a sense of what they mean, and if the particular object happened to exist, you would have the knowledge to identify it.

You also know, or have the capacity to discover, when sentences are true or false; that is, if you know the meaning of a sentence, you know its **truth conditions**. In some cases it is obvious or redundant (*All kings are male* [true]; *All bachelors are married* [false]); in other cases you need some further, non-linguistic knowledge (*Molybdenum conducts electricity*); but by knowing the meaning, you know the kind of world knowledge that is needed. Often, if you know that a sentence is true (*Nina bathed her dogs*), you can infer that another sentence must also be true (*Nina's dogs got wet*); that is, the first sentence entails the second sentence.

truth condition The circumstances that must be known to determine whether a sentence is true, and therefore part of the meaning, or **sense**, of declarative sentences.

lexical semantics The subfield of semantics concerned with the meanings of words and the meaning relationships among words.

phrasal/sentential semantics The subfield of semantics concerned with the meaning of syntactic units larger than the word.

context
The discourse preceding an utterance together with the real-world knowledge of speakers and listeners; see also **linguistic context**, **situational context**.

pragmatics
The study of how context and situation affect meaning.

semantic rules
Principles for determining the meaning of larger units like sentences from the meaning of smaller units like noun phrases and verb phrases.

truth-conditional semantics
A theory of meaning that takes the **semantic knowledge** of knowing when sentences are true and false as basic.

compositional semantics
A theory of meaning that calculates the **truth value** or meaning of larger units by the application of semantic rules to the **truth value** or meaning of smaller units.

truth value
True or false; used to describe the truth of declarative sentences in context. The **reference** of a declarative sentence in **truth-conditional semantics**.

All of this knowledge about meaning extends to an unlimited set of sentences, just like your syntactic knowledge, and is part of the grammar of the language. Part of the job of the linguist is to reveal and make explicit this knowledge about meaning that every speaker has.

The study of the linguistic meaning of morphemes, words, phrases and sentences is called semantics (see Chapter 1). The subfields of semantics are **lexical semantics**, which is concerned with the meanings of words and the meaning relationships among words, and **phrasal** or **sentential semantics**, which is concerned with the meanings of syntactic units larger than the word. The study of how **context** affects meaning – for example, how the sentence *It's cold in here* comes to be interpreted as 'close the windows' in certain situations – is called **pragmatics**.

What speakers know about sentence meaning

> Surely all this is not without meaning.
>
> Herman Melville, *Moby Dick*, 1851

In this section we discuss the linguistic knowledge you have that permits you to determine the truth of sentences, when one sentence entails another and whether a sentence is ambiguous. We will show you one attempt to account for this knowledge in the grammar by formulating **semantic rules** that build the meaning of a sentence from the meaning of its words and the way they combine syntactically. This is often called **truth-conditional semantics** because it takes the semantic knowledge of truth as basic. It is also called **compositional semantics** because it calculates the truth value of a sentence by composing, or putting together, the meaning of smaller units. We will limit our discussion to declarative sentences, such as *Jack swims* or *Jack kissed Laura*, because we can judge these kinds of sentences as either true or false. At least part of their meaning, then, will be their **truth value**.

Truth

> Having Occasion to talk of Lying and false Representation, it was with much Difficulty that he comprehended what I meant … For he argued thus: That the Use of Speech was to make us understand one another and to receive Information of Facts; now if any one said the Thing which was not, these Ends were defeated; because I cannot properly be said to understand him … And these were all the Notions he had concerning that Faculty of Lying, so perfectly well understood, and so universally practiced among human Creatures.
>
> Jonathan Swift, *Gulliver's Travels*, 1726

Suppose you are at the poolside and your friend Jack is swimming in the pool. If you hear the sentence *Jack swims*, and you know the meaning of that sentence, then you will judge the sentence to be true. On the other hand, if you are indoors and you happen to know that Jack never learnt to swim, then when you hear the very same sentence *Jack swims,* you will judge the sentence to be false and you will think the speaker is misinformed or lying. More generally, if you know the meaning of a sentence, then you can determine under what conditions it is true or false.

Note that you do not need to actually *know* whether a sentence is true or false to know its meaning. Knowing the meaning informs you as to how to *determine* the truth value. The sentence *Copper conducts electricity* has meaning and is perfectly understood precisely because we know how to determine whether it is true or false; for example, by use of a voltmeter. We could also comment sensibly on the sentence by noting the use of copper wire in lamps. If the sentence was *Crumple-horned snorkacks incarnadine nargles* you would find it meaningless because you would not have the foggiest idea how to determine whether it is true or false. Reducing the question of meaning to the question of truth conditions has proved to be very fruitful in understanding the semantic properties of language.

For most sentences it does not make sense to say that they are always true or always false in general. Rather, they are true or false in a given situation, as we previously saw with *Jack swims*. But a restricted number of sentences are always true, no matter the situation in which you utter them. They are called **tautologies**. (The term **analytic** is also used for such sentences.) Examples of tautologies are sentences such as *Circles are round* or *A person who is single is not married*. Their truth is guaranteed by the meaning of their parts and the way they are put together, irrespective of circumstances. Similarly, some sentences are always false. These are called **contradictions**. Examples of contradictions are sentences such as *Circles are square* or *A bachelor is married*.

tautology (or analytic) A sentence that is true in all situations; a sentence true from the meaning of its words alone.

contradiction A sentence that is false by virtue of its meaning alone, irrespective of context; see **analytic**, **tautology**.

Entailment and related notions

> You mentioned your name as if I should recognise it, but beyond the obvious facts that you are a bachelor, a solicitor, a Freemason, and an asthmatic, I know nothing whatever about you.
>
> Sir Arthur Conan Doyle, 'The Norwood Builder', in *The Memoirs of Sherlock Holmes*, 1894

Much of what we know is deduced from what people say alongside our observations of the world. As we can deduce from the above quotation, Sherlock Holmes took deduction to the ultimate degree. Often, deductions can be made based on language alone.

If you know that the sentence *Jack swims beautifully* is true, then you know that the sentence *Jack swims* must be true as well. This meaning relation is called **entailment**. We say that *Jack swims beautifully* entails *Jack swims*. More generally, one sentence entails another if whenever the first sentence is true the second one is also true, in all conceivable circumstances.

entailment The relationship between two sentences where the truth of one necessarily follows from the truth of the other.

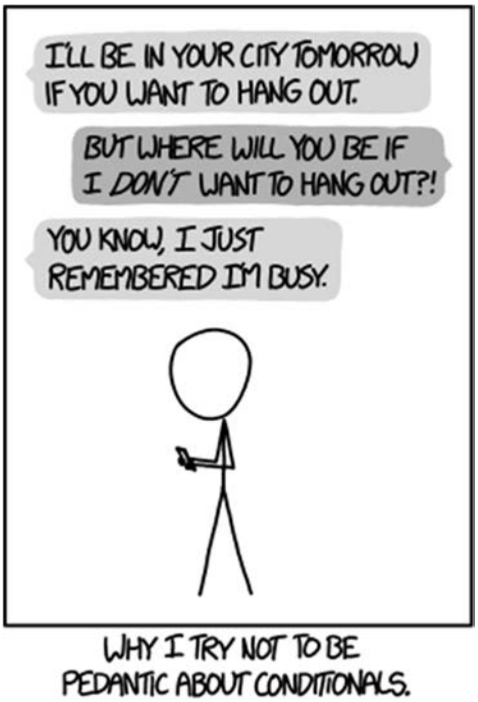
synonymous A meaning relation in which sentences have the same truth values in all situations; see also **paraphrase**.

Generally, entailment goes in only one direction. So while the sentence *Jack swims beautifully* entails *Jack swims*, the reverse is not true. Knowing merely that *Jack swims* is true does not necessitate the truth of *Jack swims beautifully* because Jack could be a poor swimmer.

The notion of entailment can be used to reveal knowledge that we have about other meaning relations. For example, omitting tautologies and contradictions, two sentences are **synonymous** (or **paraphrases**) if they are both true or both false with respect to the same situations. Sentences such as *Jack put off the meeting* and *Jack postponed the meeting* are synonymous, because when one is true the other must be true, and when one is false the other must also be false. We can describe this pattern in a more concise way by using the notion of entailment:

Two sentences are synonymous if they entail each other. Therefore, if sentence A entails sentence B and vice versa, then whenever A is true B is true, and vice versa. Although entailment says nothing specifically about false sentences, it is clear that if sentence A entails sentence B, then whenever B is false, A must be false. (If A were true, B would have to be true.) And if B also entails A, then whenever A is false, B would have to be false. Thus mutual entailment guarantees identical truth values in all situations; the sentences are synonymous.

Two sentences are **contradictory** if, whenever one is true, the other is false or, equivalently, there is no situation in which they are both true or both false. The sentences *Jack is alive* and *Jack is dead*, for example, are contradictory because if the sentence *Jack is alive* is true, then the sentence *Jack is dead* is false and vice versa. In other words, *Jack is*



xkcd.com

alive and *Jack is dead* have opposite truth values. Like synonymy, contradiction can be reduced to a special case of entailment:

paraphrase
A sentence with the same **truth conditions** as another, or the same meaning except possibly for minor differences in emphasis.

contradictory
Mutual negative entailment; the truth of one sentence necessarily implies the falseness of another sentence, and vice versa.

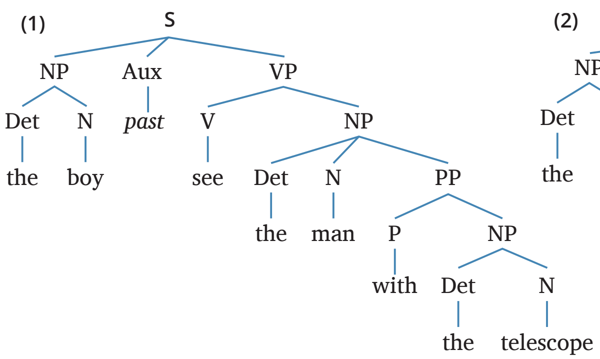
Two sentences are contradictory if one entails the negation of the other. For instance, *Jack is alive* entails the negation of *Jack is dead*, namely, *Jack is not dead*. Similarly, *Jack is dead* entails the negation of *Jack is alive*, namely, *Jack is not alive*.

The notions of contradiction (always false) and contradictory (opposite in truth value) are related in that if two sentences are contradictory, their conjunction with *and* is a contradiction. Therefore, *Jack is alive and Jack is dead* is a contradiction; it cannot be true under any circumstances.

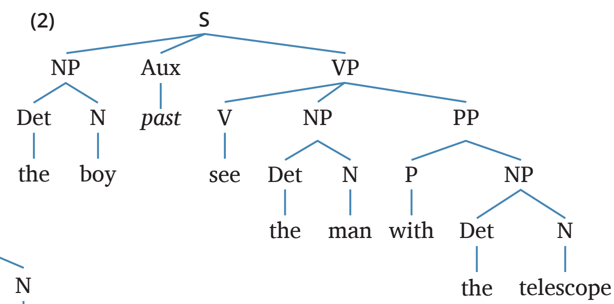
Ambiguity

Our semantic knowledge tells us when words or phrases (including sentences) have more than one meaning; that is, when they are ambiguous. In Chapter 5 we saw that the sentence *The boy saw the man with a telescope* was an instance of structural ambiguity. It is ambiguous because it can mean that the boy saw the man by using a telescope or that the boy saw the man who was holding a telescope. The sentence is structurally ambiguous because it is associated with two different phrase structures, each corresponding to a different meaning. Here are the two structures:

(1)



(2)



In (1) the PP *with a telescope* modifies the N *man*, so the interpretation is that the man has a telescope. In (2) the PP *with a telescope* modifies V, the action of seeing the man, so the interpretation is that the boy saw the man by using the telescope.

principle of compositionality
A principle of semantic interpretation that states that the meaning of a word, phrase or sentence depends on the meaning of its components (**morphemes**, words, phrases) and on how they are combined structurally.

Lexical ambiguity arises when at least one word in a phrase has more than one meaning. The sentence *This will make you smart*, for instance, is ambiguous because of the two meanings of the word *smart*: 'clever' or 'experience a burning sensation'. (We will indicate words by using *italics* and semantic features by single quotes.) This concept will be further elaborated in the following.

Our knowledge of lexical and structural ambiguities reveals that the meaning of a linguistic expression is built on the words it contains and its syntactic structure. The notion that the meaning of an expression is composed of the meanings of its parts and how they are combined structurally is referred to as the **principle of compositionality**. In the next section we discuss the rules by which the meaning of a phrase or sentence is computed based on its composition.

Compositional semantics

In Chapter 5 we stated that grammar must contain syntactic rules to account for speakers' knowledge of grammaticality, constituent structure and relations between sentences, as well as for the limitless creativity of our linguistic competence, so we concluded in the previous chapter that grammar must contain syntactic rules.

To account for speakers' knowledge of the truth, reference, entailment and ambiguity of sentences, as well as for our ability to determine the meaning of a limitless number of expressions, we must suppose that grammar contains semantic rules that combine the meanings of words into meaningful phrases and sentences.

Semantic rules

In the sentence *Jack swims*, we have the knowledge that the word *Jack*, which is usually called a **proper name**, refers to a precise object in the world, which is its **referent**. In the scenario given earlier, for instance, the referential meaning of *Jack* is the guy who is your friend and who is swimming happily in the pool right now. Based on this, we conclude that the meaning of the name *Jack* is the individual it refers to. (We will learn more about proper names and reference in the section on lexical semantics.)

proper name
A word that refers to a person, place or other entity with a unique reference known to the speaker and listener; usually capitalised in writing.

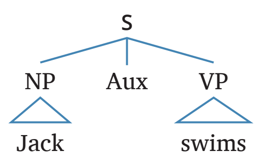
referent
The entity designated by an expression.

What about the meaning of the verb *swim*? At first, it seems as though verbs like *swim* cannot pick out a particular thing in the world the way proper names do. But there is a way to think about verbs (and adjectives, and common nouns like *cake*) in terms of what they refer to. Just as the referent of *Jack* relies on what is happening in the world – whether Jack exists, and whether he is swimming in the pool right now – the referent of *swim* depends on what is happening in the world. Based in part on early philosophical work conducted by Gottlob Frege and Bertrand Russell, semanticists think that the best way to define predicates (verbs, adjectives and common nouns) is in terms of the individuals that those predicates successfully describe. In particular, the best way to characterise the meaning of *swim* – and a way in which that meaning is reflected in the world – is by having it denote the *set* of individuals (e.g. human beings and animals) that swim. This assumption captures the intuition that if you know the meaning of *swim* then, given a specific situation and enough knowledge about it, you can separate who is a swimmer from who is not, that is, you can group the swimmers together. You can do the same with any other verb (or adjective or nouns).

Our semantic rules must be sensitive not only to the meaning of individual words but to the structure in which they occur. Taking as an example our simple sentence *Jack swims*, let us see how the semantic rules compute its meaning. The meanings of the individual words are summarised as follows:

Word	Meanings
Jack	refers to (or means) the individual Jack
swims	refers to (or means) the set of individuals who swim

The phrase structure tree for our sentence is as follows:

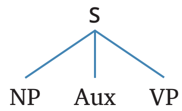


The tree tells us that syntactically the noun phrase (NP) *Jack* and the verb phrase (VP) *swims* combine to form a sentence (S). We want to mirror that combination at the semantic level: in other words, we want to combine the meaning of the NP *Jack* (an individual) and the meaning of the VP *swims* (a set of individuals) to obtain the meaning of the sentence *Jack swims*. This is done by means of Semantic Rule I.

Worked example

Semantic rule I

The meaning of:



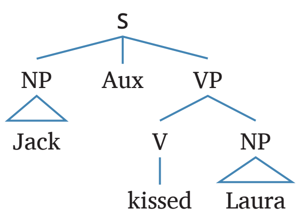
is the following truth condition:

If the meaning of NP (an individual) is a member of the meaning of VP (a set of individuals), then S is TRUE; otherwise it is FALSE.

Rule I states that a sentence that is made up of a subject NP and a VP is true if the subject NP refers to an individual who is among the members of the set that constitutes the meaning of the VP. Notice that this rule is completely general; it does not refer to any particular sentence, individuals or verbs. It works equally well for sentences such as *Ellen sings* or *Rex barks*. Therefore the meaning of *Rex barks* is the truth condition (i.e. the 'if-sentence') that states that the sentence is true if the individual referred to by *Rex* is among the set of individuals referred to by *barks* and so on.

Let us now try a slightly more complex case: the sentence *Jack kissed Laura*. The main syntactic difference between this example and the previous one is that we now have a transitive verb that requires an extra NP in object position; otherwise our semantic rules will derive the meaning using the same mechanical procedure as in the first example. We again start with the word meanings and syntactic structure.

Word meanings	
Jack	refers to (or means) the individual Jack
Laura	refers to (or means) the individual Laura
kissed	refers to (or means) the set of pairs of individuals X and Y such that X kissed Y.

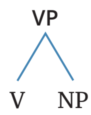


The meaning of the transitive verb *kiss* is still a set, but this time the set consists of *pairs* of individuals. The first individual of each pair is the kisser, while the second is the one kissed. This captures the intuition that if you know the meaning of *kiss*, then you are able to establish who kissed who in a given situation; that is, you are able to group people into pairs of kissers and kissees. If a set of pairs is the meaning of a transitive verb like *kiss*, what is the meaning of the VP resulting from combining a transitive verb with its object as in the VP *kissed Laura*? Like the simple VP *swim* we saw earlier, the meaning of the complex VP *kissed Laura* is a set of individuals – all and only those individuals that kissed Laura in a given situation. This may be expressed formally in Semantic Rule II.

Worked example

Semantic rule II

The meaning of:



is the set of individuals X such that X is the first member of any pair in the meaning of V whose second member is the meaning of NP.

The meaning of the sentence is derived by first applying Semantic Rule II, which establishes the meaning of the VP as a certain set of individuals, namely, those who kissed Laura. Now Semantic Rule I applies and gives the meaning of the sentence to be true whenever the meaning of *Jack* is a member of the set that is the meaning of the VP *kissed Laura*. In other words, the sentence is true if Jack kissed Laura and false otherwise. These two semantic rules handle an essentially infinite number of intransitive and transitive sentences.

One last example will illustrate how the semantic knowledge of entailment may be represented in the grammar. Consider *Jack swims beautifully* and consider further the meaning of the adverb *beautifully*. Its meaning is clearly not an individual or a set of individuals. Rather, the meaning of *beautifully* is an operation that reduces the size of the sets that are the meanings of VPs. When applied to the meaning of swims, it reduces the set of individuals who swim to the smaller set of those who swim beautifully. We will not express this rule formally, but it is now easy to see one source of entailment. The truth conditions that make *Jack swims beautifully* true are narrower than the truth conditions that make *Jack swims* true by virtue of the fact that among the individuals who swim, fewer of them swim beautifully. Therefore, any truth condition that causes *Jack swims beautifully* to be true necessarily causes *Jack swims* to be true, hence *Jack swims beautifully* entails *Jack swims*.

Rules such as these give the truth conditions of sentences by taking the meanings of words and combining them according to the syntactic structure of the sentence. It is easy to see from these examples how ambiguous meanings arise. Because the meaning of a sentence is computed based on its hierarchical organisation, different trees will have different meanings – structural ambiguity – even when the words are the same, as in the example *The boy saw the man with a telescope*. The occurrence of an ambiguous word – lexical ambiguity – when it combines with the other elements of a sentence can make the entire sentence ambiguous, as in *She can't bear children*.

The semantic theory of sentence meaning that we just sketched is not the only possible one and it is also incomplete, as shown by the **paradoxical** sentence *This sentence is false*. The sentence cannot be true, else it is false; it cannot be false, else it is true. Therefore, it has no truth value, though it certainly has meaning. This notwithstanding, compositional truth-conditional semantics has proven to be an extremely powerful and useful tool for investigating the semantic properties of natural languages.

paradox
A sentence to which it is impossible to ascribe a **truth value**.

When compositionality goes awry

> A loose sally of the mind; an irregular undigested piece; not a regular and orderly composition.
>
> Samuel Johnson (1709–1784)

The meaning of an expression is not always obvious, even to a native speaker of the language. Meanings may be obscured in many ways, or at least may require some imagination or special knowledge to be apprehended. Poets, pundits and, yes, even professors can be difficult to understand.

anomaly
A violation of semantic rules resulting in expressions that seem nonsensical.

metaphor
A non-literal, suggestive meaning in which an expression that designates one thing is used implicitly to mean something else.

idiom/idiomatic phrase
An expression whose meaning does not conform to the principle of compositionality; that is, may be unrelated to the meaning of its parts.

In the previous sections we saw that semantic rules compute sentence meaning compositionally based on the meanings of words and the syntactic structure that contains them. There are, however, interesting cases in which compositionality breaks down, because there is a problem either with the words or with the semantic rules. If one or more words in a sentence do not have a meaning, then obviously we will not be able to compute a meaning for the entire sentence. Moreover, even if the individual words have meaning, if they cannot be combined as the syntactic structure and related semantic rules require, we will also not get to a meaning. We refer to this phenomenon as semantic **anomaly**. Alternatively, it might require a lot of creativity and imagination to derive a meaning. This is what happens in **metaphors**. Finally, some expressions – called **idioms** – have a fixed meaning; that is, a meaning that is not compositional. Applying compositional rules to idioms gives rise to funny or inappropriate meanings.

Anomaly

> Don't tell me of a man's being able to talk sense; everyone can talk sense. Can he talk nonsense?
>
> William Pitt (1759–1806)
>
> There is no greater mistake in the world than the looking upon every sort of nonsense as want of sense.
>
> Leigh Hunt, 'On the Talking of Nonsense', 1820

The semantic properties of words determine what other words they can be combined with. A sentence widely used by linguists that we encountered in Chapter 5 illustrates this fact:

Colourless green ideas sleep furiously.

The sentence obeys all the syntactic rules of English. The subject is *colourless green ideas* and the predicate is *sleep furiously*. It has the same syntactic structure as the sentence:

Dark green leaves rustle furiously.

anomalous
Semantically ill formed though typically obeying syntactic rules.

uninterpretable
Describes an utterance whose meaning cannot be determined because of nonsense words.

but there is obviously something semantically wrong with the sentence. The meaning of *colourless* includes the semantic feature 'without colour', but it is combined with the adjective *green*, which has the feature 'green in colour'. How can something be both 'without colour' and 'green in colour'? Other semantic violations occur in the sentence. Such sentences are semantically **anomalous**.

Other English 'sentences' make no sense at all because they include 'words' that have no meaning; that is, they are **uninterpretable**. They can be interpreted only if some meaning for each nonsense word can be dreamed up. Lewis Carroll's 'Jabberwocky' is probably the most famous poem in which most of the content words have no meaning – they do not exist in the lexicon of the grammar. Still, all the sentences sound as if they should be or could be English sentences:

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe
All mimsy were the borogoves
And the mome raths outgrabe …
He took his vorpal sword in hand
Long time the manxome foe he sought
So rested he by the Tumtum tree
And stood awhile in thought.

Without knowing what *vorpal* means, you nevertheless know that:

He took his vorpal sword in hand

means the same thing as:

He took his sword, which was vorpal, in hand.

It was in his hand that he took his vorpal sword.

Knowing the language, and assuming that *vorpal* means the same thing in the three sentences (because the same sounds are used), you can decide that the sense – the truth conditions – of the three sentences are identical. In other words, you are able to decide that two things mean the same thing even though you do not know what either one means. You decide by assuming that the semantic properties of *vorpal* are the same whenever it is used.

We now see why Alice commented, when she had read 'Jabberwocky':

> 'It seems very pretty … but it's *rather* hard to understand!' [You see she didn't like to confess, even to herself, that she couldn't make it out at all.] 'Somehow it seems to fill my head with ideas – only I don't exactly know what they are! However, *somebody* killed *something*: that's clear, at any rate – '

Semantic violations in poetry may form strange but interesting aesthetic images, as in Dylan Thomas' phrase *a grief ago*. *Ago* is ordinarily used with words specified by some temporal semantic feature:

a week ago		*a table ago
an hour ago	but not	*a dream ago
a month ago		*a mother ago
a century ago		

When Thomas used the word *grief* with *ago*, he was adding a durational feature to grief for poetic effect, so while the NP is anomalous, it evokes certain feelings.

In the poetry of E E Cummings,[1] there are phrases such as:

the six subjunctive crumbs twitch

a man … wearing a round jeer for a hat

children building this rainman out of snow.

E. E. Cummings

Though all of these phrases violate some semantic rules, we can understand them; breaking the rules creates the imagery desired. The fact that we are able to understand, or at least interpret, anomalous expressions, and at the same time recognise their anomalous nature, demonstrates our knowledge of the semantic system and semantic properties of the language.

Metaphor

> Our doubts are traitors.
>
> Shakespeare, *Measure for Measure*, c. 1603
>
> Walls have ears.
>
> Cervantes, *Don Quixote*, 1605
>
> The night has a thousand eyes and the day but one.
>
> Frances William Bourdillon, 'Light', 1873

When what appears to be an anomaly is nevertheless understood in terms of a meaningful concept, the expression becomes a metaphor. There is no strict line between anomalous and metaphorical expressions. Technically, metaphors are anomalous, but the nature of the anomaly creates the salient meanings that metaphors usually have. The anomalous *a grief ago* might come to be interpreted by speakers of English as the unhappy time following a sad event and therefore become a metaphor.

Metaphors may have a literal meaning as well as their metaphorical meaning, so in some sense they are ambiguous. However, when the semantic rules are applied to *Walls have ears*, for example, the literal meaning is so unlikely that listeners use their imagination for another interpretation. The principle of compositionality is very rubbery and when it fails to produce an acceptable literal meaning, listeners try to accommodate and stretch the meaning. This accommodation is based on semantic properties that are inferred or that provide some kind of resemblance or comparison that can end up as a meaningful concept.

This works only up to a certain point, however. It is not clear what the literal meaning of *Our doubts are traitors* might be, though the notion that the act of doubting a precious belief is a form of self-betrayal seems plausible. To interpret metaphors we need to understand at least the meaning of the words that comprise them, if not the literal meaning of the whole, and, significantly, facts about the world. To understand the metaphor *Time is money* it is necessary to know that in our society we are often paid according to the number of hours or days worked. In fact, 'time', which is an abstract concept, is the subject of multiple metaphors. We save time, waste time, manage time, push things back in time, live on borrowed time and suffer the ravages of time as the sands of time drift away. In effect, the metaphors take the abstract concept of time and treat it as a concrete object of value.

Metaphor has a strong cultural component. Shakespeare used metaphors that are lost on many today. *I am a man whom Fortune hath cruelly scratched* is most effective as a metaphor in a society such as Shakespeare's that commonly depicts Fortune as a woman. On the other hand, *My computer has a virus* would make little sense in a culture without computers, even if the idea of having a virus is indicative of a problem.

Many expressions now taken literally may have originated as metaphors, such as *a fall in the dollar* meaning its decline in value on the world market. Many people would not bat an eyelid (another metaphor) at the literal interpretation of saving or wasting time. Metaphor is one of the factors in language change (see Chapter 10). Metaphorical use of language is language creativity at its highest. Nevertheless, the basis of metaphorical use is very much our ordinary linguistic knowledge about words, their semantic properties and their combinatorial powers.

Idioms

Because the words (or morphemes) of a language are arbitrary (not predictable by rule), they must be listed in a mental lexicon. The lexicon is a repository of the words (or morphemes) of a language and their meanings. On the other hand, the meanings of morphologically complex words, phrases and sentences are compositional and are derived by rules. We noted in Chapter 4 that the meanings of some words (e.g. compounds) are not predictable, so these must also be given in the lexicon. It turns out that languages also contain many phrases whose meanings are not predictable on the basis of the meanings of the individual words. These phrases typically start out as metaphors that 'catch on' and are repeated so often that they become fixtures in the language. Such expressions are called idioms, or idiomatic phrases, as in these English examples:

sell down the river

rake over the coals

eat my hat

let their hair down

put his foot in his mouth

throw her weight around

snap out of it

cut it out

hit it off

get it off

bite your tongue

give a piece of your mind.

Idioms are similar in structure to ordinary phrases except that they tend to be frozen in form and do not readily enter into other combinations or allow their word order to change. Therefore:

1 She put her foot in her mouth.

has the same structure as:

2 She put her bracelet in her drawer.

The sentences:

The drawer in which she put her bracelet was hers.

Her bracelet was put in her drawer.

are related to sentence (2) and have essentially the same meaning. But these:

The mouth in which she put her foot was hers.

Her foot was put in her mouth.

do not have the idiomatic sense of sentence (1), except, perhaps, humorously.

Also, if we know the meaning of (2) and the meaning of the word *necklace* we will immediately understand (3).

3 She put her necklace in the drawer.

But if we try substituting *hand* for *foot* in sentence (1), we do not maintain the idiomatic meaning, but rather have the literal compositional meaning.

On the other hand, the words of some idioms can be moved without affecting the idiomatic sense:

The police kept tabs on suspected terrorists.

Tabs were kept on suspected terrorists by the police.

Suspected terrorists were kept tabs on by the police.

Like metaphors, idioms can break the rules on combining semantic properties. The object of *eat* must usually be something with the semantic feature 'edible', but in:

He ate his hat.

Eat your heart out.

this restriction is violated.

Idioms often lead to humour:

What did the doctor tell the vegetarian about his surgically implanted heart valve from a pig?

That it was okay as long as he didn't 'eat his heart out'.

With some imagination, idioms may also be used to create what appear to be paradoxes. In many places, such as Times Square in New York, a ball is dropped at midnight on New Year's Eve.

Now, if the person in charge does not drop the ball, then he has *dropped the ball*. And if that person does indeed drop the ball, then he has not *dropped the ball*. Right?

Idioms, grammatically as well as semantically, have special characteristics. They must be entered into the lexicon or mental dictionary as single items with their meanings specified, and speakers must learn the special restrictions on their use in sentences.

Although most if not all languages have idioms, they rarely if ever translate word for word from one language to another. Most speakers of Australian English understand the idiom *to kick the bucket* as meaning 'to die'. The same combination of words in Spanish (*patear el cubo*) has only the literal meaning of striking a specific bucket with a foot. On the other hand, *estirar la pata*, literally 'to stretch the (animal) leg', has the idiomatic sense of 'to die' in Spanish.

Most idioms originate as metaphorical expressions that establish themselves in the language and become frozen in their form and meaning.

Lexical semantics (word meanings)

> 'There's glory for you!' 'I don't know what you mean by "glory",' Alice said. Humpty Dumpty smiled contemptuously. 'Of course you don't – till I tell you. I meant "there's a nice knock-down argument for you"!' 'But "glory" doesn't mean "a nice knock-down argument",' Alice objected. 'When I use a word,' Humpty Dumpty said, in rather a scornful tone, 'it means just what I choose it to mean – neither more nor less.' 'The question is,' said Alice, 'whether you can make words mean so many different things.'
>
> Lewis Carroll, *Through the Looking-Glass*, 1871

As just discussed, the meaning of a phrase or sentence is partially a function of the meanings of the words it contains. Similarly, the meaning of morphologically complex words is a function of their component morphemes, as we saw in Chapter 4. However, there is a fundamental difference between word meaning – or lexical semantics – and sentence meaning. The meaning of entries in the mental lexicon – be they morphemes, words, compound words, idioms and so on – is conventional; that is, speakers of a language implicitly agree on their meaning and children acquiring the language must simply learn those meanings outright. On the other hand, the meanings of most sentences must be constructed by the application of semantic rules. Earlier we discussed the rules of semantic composition. In this section we will talk about word meaning and the semantic relationships that exist between words and morphemes.

Although the agreed-on meaning of a word may shift within a language community over time, as we shall see in Chapter 10, we are not free as individuals to change the meanings of words at will; if we did, we would be unable to communicate with each other. As we see from the quotation above, Humpty Dumpty was unwilling to accept this convention. Fortunately for us there are few Humpty Dumptys among speakers. All the speakers of a language share a basic vocabulary – the sounds and meanings of morphemes and words. Each of us knows the meanings of thousands of words, knowledge that permits us to use words to express our thoughts and to understand the thoughts of others. The meaning of words is part of linguistic knowledge. Your mental storehouse of information about words and morphemes is what we have been calling the lexicon.

Theories of word meaning

> It is natural … to think of there … being connected with a sign … besides … the reference of the sign, also what I should like to call the sense of the sign …
>
> Gottlob Frege, *On Sense and Reference*, 1892

Dictionaries such as the *Oxford English Dictionary* (OED) and the *Macquarie Dictionary* are filled with words and their meanings. Dictionaries give the meanings of words using other words, rather than in terms of some more basic vocabulary. In this sense a dictionary really provides *paraphrases* rather than meanings. It relies on our knowledge of the language to understand the definitions. The meanings associated with words in our mental lexicon are probably not like what we find in the OED or the *Macquarie*, although it is, admittedly, very difficult to specify precisely how word meanings are represented in the mind.

Reference

If the meaning of a word is not like a dictionary entry, what is it? This question has been debated by philosophers and linguists for centuries. One proposal is that the meaning of a word or expression is its **reference**, its association with the object it refers to. This real-world object is called the 'referent'.

reference
That part of the meaning of a noun phrase that associates it with some entity. That part of the meaning of a declarative sentence that associates it with a **truth value**, either true or false; see also **referent**, **sense**.

We have already determined that the meaning of a proper name, such as *Jack*, is its reference – the link between the word *Jack* and the person named Jack, which is its referent. Proper names are NPs; you can substitute a proper name in any NP position in a sentence and preserve the sentence's grammaticality. There are other NPs that refer to individuals as well. NPs such as *the happy swimmer*, *my friend*, and *that guy*, for instance, can all be used to refer to Jack in the situation where you have observed Jack swimming. The same is true for pronouns such as *I*, *you* and *him*, which also function as NPs. In all these cases, the reference of the NP – which singles out the individual referred to under the circumstances – is part of the meaning of the NP.

On the other hand, not every NP refers to an individual. For instance, the sentence *No baby swims* contains the NP *no baby*, but your linguistic knowledge tells you that this NP does not refer to any specific individual. If *no baby* has no reference, but is not meaningless, then something about meaning beyond reference must be present.

Also in support of that 'extra something' is our knowledge that, while under certain circumstances *the happy swimmer* and *Jack* may have the same reference in that both expressions are associated with the same referent, the former has some further meaning. To see this, we observe that *the happy swimmer is happy* is a tautology – true in every conceivable situation – but *Jack is happy* is not a tautology, for there are circumstances under which that sentence might be false.

In the fictional world, *Superman* and *Clark Kent* have the same reference – they are one and the same person. But there is more meaning to their names than that. If we substitute *Clark Kent* for *Superman* in the sentence *Lois Lane is in love with Superman* we alter its truth value from true to false. Again, we see that there must be a dimension of meaning beyond mere reference.

Similarly, *Scott Morrison* and *the Prime Minister* have (at the time of writing) the same reference, but the meaning of the NP *the Prime Minister* is additionally 'the head of government of Australia', which is an element of meaning separate from reference and more enduring.

Sense

If meaning were reference alone, then the meaning of words and expressions would be the objects pointed out in the real world. The meaning of *dog*, for example, would be tied to the set of canine objects. This theory of word meaning is attractive because it underscores the idea that meaning is a connection between language on the one hand, and objects and events in the world on the other.

An obvious problem for such a theory is that speakers know many words that have no real-world referents (e.g. *unicorns*, *Hobbits* and *Harry Potter*). Yet speakers do know the meaning of these expressions. Similarly, what real-world entities would function words, such as *of* and *by*, or modal verbs, such as *will* or *may*, refer to?

sense
The inherent part of an expression's meaning that, together with context, determines its referent; also called intension.

coreferential
Describes noun phrases (including pronouns) that refer to the same entity.

These additional elements of meaning are often termed **sense**. It is the extra something referred to earlier. *Unicorns*, *Hobbits*, and *Harry Potter* have sense but no reference (with regard to objects in the real world). Conversely, proper names typically have only reference. A name like *Clem Kadiddlehopper* may point out a certain person, its referent, but has little linguistic meaning beyond that. Sometimes two different proper names have the same referent, such as Central Station and Railway Square, or George Eliot and Mary Ann Evans. It is a hotly debated question in the philosophy of language as to whether such **coreferential** expressions have the same or different senses.

Philosophers of language dating back to ancient Greece have suggested that part of the meaning of a word is the mental image it conjures up. This helps with the problem of unicorns, Hobbits and Harry Potter; we may have a clear image of these entities from books, movies and so on, and that connection might serve as reference for those expressions. However, many meaningful expressions are not associated with any clear, unique image agreed on by most speakers of the language. For example, what image is evoked by the words *very*, *if* and *every*? It is difficult to say, yet these expressions are certainly meaningful. What is the image of *oxygen* as distinct from *nitrogen*? Both are colourless, odourless gases, yet they differ in meaning. What mental image would we have of *dog* that is general enough to include Yorkshire terriers and Great Danes and yet excludes foxes and wolves? And the image of *no man* in *no man is an island* presents a riddle worthy of a Zen kōan.

Although the idea that the meaning of a word corresponds to a mental image is intuitive (because many words do provoke imagery), it is clearly inadequate as a general explanation of what people know about word meanings.

Perhaps the best we can do is to note that the reference part of a word's meaning, if it has reference at all, is the association with its referent; and the sense part of a word's meaning contains the information needed to complete the association, and to suggest properties that the referent may have, whether it exists in the real world or in the world of imagination.

synonym
A word with the same or nearly the same meaning as another.

polysemous/ polysemy
Describes a single word with several closely related but slightly different meanings.

homonym
A word pronounced the same as another and spelt the same, e.g. *bat* the animal, *bat* the stick, and *bat* meaning 'to flutter' as in *bat the eyelashes*.

lexical ambiguity
Multiple meanings of sentences due to words that have multiple meanings.

Lexical relations

> 'Mine is a long and sad tale!' said the Mouse, turning to Alice and sighing. 'It is a long tail, certainly,' said Alice, looking with wonder at the Mouse's tail, 'but why do you call it sad?'
>
> Lewis Carroll, *Alice's Adventures in Wonderland*, 1865

Knowing a word means knowing its sounds/signs and its meaning. Both are crucial in determining whether words are the same or different. Therefore, *sofa* and *dog*, which have nothing in common in either their pronunciation or meaning, are clearly different words. However, things are not always so straightforward. What about *sofa* and *couch*, or *letter* (of the alphabet) and (business) *letter*, or *bat* (the animal) and (cricket) *bat*, or *tale* and *tail*, or *lead* (the metal) and (*to*) *lead*? Although *sofa* and *couch* share the same meaning (they are **synonyms**), that is all they have in common, so we do not accept them as being the same word. By contrast, *letter* (of the alphabet) and (business) *letter* are not different words; here we have a single word with multiple meanings that are related conceptually and historically. *Letter* is said to be **polysemous** (pronounced 'polly-seamus'). Open a dictionary of English to any page and you will find words with more than one definition (e.g. *guard*, *finger*, *overture*). Each of these words is polysemous because each has several related meanings.

Conversely, *bat* (the animal) and (cricket) *bat* are identical in pronunciation (and spelling) and yet their meanings are unrelated, so they too can be regarded as different words, called **homonyms**. Homonyms are different words that are pronounced the same and spelt the same. Homonyms can create **lexical ambiguity**. A word or a sentence is ambiguous if it can be understood or interpreted in more than one way. The sentence:

I'll meet you by the bank.

may mean 'I'll meet you by the financial institution' or 'I'll meet you by the riverside'. The ambiguity is due to the two homonyms *bank* (financial institution) and *bank* (riverside). Sometimes additional context can help to disambiguate the sentence:

I'll meet you by the bank, in front of the ATM.

I'll meet you by the bank. We can go skinny-dipping.

Two more specific types of homonymy may be identified: *tale* and *tail* are **homophones**; *lead* (the metal) and (*to*) *lead* are **homographs**. Whereas with homonyms the pronunciation and spelling are the same (further examples are *saw* [the tool] and *saw* [past tense of *see*]), homophones are pronounced the same but spelt differently (further examples are *bear* and *bare*; *to*, *too* and *two*), and homographs are spelt the same but pronounced differently (further examples are *wind* (movement of air) and *(to) wind*; *tear* (in the eye) and (*to*) *tear*).

homophone
A word pronounced identically to another but spelt differently, e.g. *bare* meaning 'without covering, unconcealed' and *bear* the animal; also *to*, *too*, *two*.

homograph
A word spelt identically to another but pronounced differently, e.g. *lead*, the metal, and *lead*, what leaders do.

Not only are there words that sound the same but have different meanings, but there are also words that sound different but have the same or nearly the same meaning, as illustrated in the poem 'The Akond of Swat' by Edward Lear:

Does he wear a turban, a fez or a hat?

Does he sleep on a mattress, a bed or a mat, or a Cot

The Akond of Swat?

Can he write a letter concisely clear

Without a speck or a smudge or smear or Blot

The Akond of Swat?

As discussed above, such words are called synonyms. There are dictionaries of synonyms that contain many hundreds of entries, such as:

apathetic/phlegmatic/passive/sluggish/indifferent

pedigree/ancestry/genealogy/descent/lineage

It has been said that there are no perfect synonyms – that is, no two words ever have exactly the same meaning. Still, the following two sentences have very similar meanings.

He's sitting on the sofa.

He's sitting on the couch.

Some individuals may prefer to use *sofa* instead of *couch*, but if they know the two words, they will understand both sentences and interpret them to mean essentially the same thing. The degree of semantic similarity between words depends largely on the number of semantic properties they share. *Sofa* and *couch* refer to the same type of object and share most of their semantic properties.

During the French Norman occupation of England that began in 1066 CE, many French words of Latin origin were imported into English. As a result, English contains many synonymous pairs consisting of a word with an English (or Germanic) root, and another with a Latin root, such as:

English	Latin
manly	virile
heal	recuperate
send	transmit
go down	descend

There are words that are neither synonyms nor near synonyms yet have many semantic properties in common. *Man* and *boy* both refer to male humans; the meaning of *boy* includes the additional semantic property of 'youth', whereby it differs from the meaning of *man*.

A polysemous word may share one of its meanings with another word, a kind of partial synonymy. *Mature* and *ripe*, for example, are polysemous words that are synonyms when applied to fruit, but not when applied to (smelly) animals. *Deep* and *profound* mean the same when applied to thought, but only *deep* can modify water.

Sometimes words that are ordinarily opposites can mean the same thing in certain contexts; thus a *good* scare is the same as a *bad* scare and a *fat* chance is about as likely as a *slim* chance. Similarly, a word with a positive meaning in one form, such as the adjective *perfect*, when used adverbially can undergo a 'weakening' effect, so that a *perfectly good bicycle* is neither perfect nor always good. *Perfectly good* means something more like 'adequate'.

When synonyms occur in otherwise identical sentences, the sentences are paraphrases; that is, they have the same meaning (except possibly for minor differences in emphasis). For example:

The motor is making a strange noise.

The engine is making a strange noise.

This use of synonyms creates a **lexical paraphrase**, just as the use of homonyms creates lexical ambiguity.

The meaning of a word may be partially defined by saying what it is *not*. *Male* means 'not female'. *Dead* means 'not alive'. Words that are opposite in meaning are often called **antonyms**. Ironically, the basic property of words that are antonyms is that they share all but one semantic property. *Beautiful* and *ugly*, and *tall* and *short* are antonyms, but *beautiful* and *tall* are not.

There are several kinds of antonymy. There are **complementary pairs**:

alive/dead	present/absent	awake/asleep

They are complementary (also known as 'contradictory') in that *not alive* = *dead*, and *not dead* = *alive* and so on. There are **gradable pairs** of antonyms:

big/small	hot/cold	fast/slow	happy/sad

The meaning of adjectives in gradable pairs is related to the object they modify. The words themselves denote the end points of a scale, rather than an absolute dichotomy. Therefore we know that *a small elephant* is much bigger than *a large mouse*. *Fast* is faster when applied to an aeroplane than to a car.

With gradable pairs, the negative of one word is not synonymous with the other: someone who is *not happy* is not necessarily *sad*. It is also true of gradable antonyms that more of one is less of another. *More bigness* is *less smallness*, *wider* is *less narrow*, *taller* is *less short*.

Gradable antonyms are often found among sets of words that partition a continuum:

tiny – small – medium – large – huge – gargantuan

euphoric – elated – happy – so-so – sad – gloomy – despondent

Another characteristic of certain pairs of gradable antonyms is that one is **marked** and the other **unmarked**. The unmarked member is the one ordinarily used in questions of degree. We would usually ask 'How *high* is the mountain?' (not 'How *low* is it?'). We answer, 'Three hundred metres high' but never 'Three hundred metres low', except humorously or ironically. Therefore *high* is the unmarked member of *high/low*. Similarly, *tall* is the unmarked member of *tall/short*, *fast* the unmarked member of *fast/slow* and so on.

lexical paraphrase
A sentence that has the same meaning as another due to **synonyms**.

antonyms
Words that are opposite with respect to one of their semantic properties.

complementary pair
Two **antonyms** related in such a way that the negation of one is the meaning of the other.

gradable pair
Two **antonyms** related in such a way that more of one is less of the other.

marked
In a **gradable pair** of **antonyms**, the word that is not used in questions of degree, e.g. *low* is the marked member of the pair *high/low* because we ordinarily ask 'How *high* is the mountain?' not '*How *low* is the mountain?'

Another kind of 'opposite' involves pairs such as:

give/receive	buy/sell	teacher/pupil

Called **relational opposites** (also known as 'converse' opposites), they display symmetry in their meaning and occur in syntactically related structures. If X *gives* Y to Z, then Z *receives* Y from X. If X is Y's *teacher*, then Y is X's *pupil*. Pairs of words ending in *-er* and *-ee* are usually relational opposites. If Mary is Bill's *employer*, then Bill is Mary's *employee*.

Comparative forms of gradable pairs of adjectives often form relational pairs. Thus, if Sally is *taller* than Alfred, then Alfred is *shorter* than Sally. If a BMW is *more expensive* than a Hyundai, then a Hyundai is *cheaper* than a BMW.

If meanings of words were indissoluble wholes, there would be no way to make the interpretations we do. We know that *big* and *red* are not opposites because they have too few semantic properties in common. They are both adjectives, but *big* has a semantic property 'about size' whereas *red* has a semantic property 'about colour'. On the other hand, *buy* and *sell* are relational opposites because both contain the semantic property 'transfer of goods or services' and they differ in only one property, 'direction of transfer'.

Some words are their own antonyms. These **autoantonyms** are words such as *cleave*, 'to split apart' or 'to cling together'; and *dust*, 'to remove something' or 'to spread something', as in dusting furniture or dusting crops. Antonymic pairs that are pronounced the same but spelt differently are similar to autoantonyms; *raise* and *raze* are one such pair.

In English, antonyms are often formed via prefixation. You can add the prefix *un-*:

likely/unlikely	able/unable	fortunate/unfortunate

or you can add *non-*:

entity/non-entity	conformist/non-conformist

or you can add *in-*:

tolerant/intolerant	discreet/indiscreet	decent/indecent

Other prefixes may also be used to form negative words morphologically: *mis-*, as in *misbehave*, *dis-*, as in *displease*.

These strategies occasionally backfire, however. *Loosen* and *unloosen*, *flammable* and *inflammable*, *valuable* and *invaluable* and a few other **antiautonyms** actually have the same or nearly the same meaning.

Speakers of English know that the words *red*, *white* and *blue* are 'colour' words; that is, their lexical representations have the feature [+colour] indicating a class to which they all belong. Similarly *lion*, *tiger*, *leopard* and *lynx* have the feature [+feline]. Such sets of words are called **hyponyms**. The relationship of hyponymy is between the more general term, such as *colour*, and the more specific instances of it, such as *red*. Therefore, *red* is a hyponym of *colour* and *lion* is a hyponym of *feline*; or, equivalently, *colour* has the hyponym *red* and *feline* has the hyponym *lion*.

Sometimes no single word in the language encompasses a set of hyponyms. Therefore, *clarinet*, *guitar*, *horn*, *piano*, *trumpet* and *violin* are hyponyms because they are 'musical instruments', but there is no single word meaning 'musical instrument' that has these words as its hyponyms.

A **metonym** substitutes the name of an attribute or concept associated with an object for the actual object that is meant. The use of (*the*) *crown* for *king*, or for the government ruled by a king, is an example of metonymy. So is the use of *brass* to refer to military leaders. Metonyms are often employed by the news services. Metonyms for governments, such as (*the*) *Kremlin*, *Washington* and *Canberra*, are commonplace. Metonyms need not be a single word; *Scotland Yard*

unmarked
In a **gradable pair** of **antonyms**, the word that is used in questions of degree, e.g. *high* is the unmarked member of *high/low*.

relational opposites
A pair of **antonyms** in which one describes a relationship between two objects and the other describes the same relationship when the two objects are reversed, e.g. *parent/child, teacher/pupil*; *John is the parent of Susie* describes the same relationship as *Susie is the child of John*; see also **gradable pair**, **complementary pair**.

autoantonym
A word that has two opposite meanings, e.g. *cleave*, 'to split apart' or 'to cling together'; see also **antonyms**.

antiautonyms
A pair of morphologically related words that have the same or nearly the same meaning though it looks like one is derived from the other by attaching the negative prefix *in-*, e.g. *flammable, inflammable*.

hyponym
A word whose meaning is a specific instance of a more general meaning, e.g. *red*, *white* and *blue* are hyponyms of the word *colour*.

metonym, metonymy
A word substituted for another word or expression with which it is closely associated.

semantic features (semantic properties)
Conceptual elements by which a person understands the meanings of words and sentences.

refers to the Criminal Investigation Department in the United Kingdom (the association is that the Metropolitan Police were once housed in an area of London called Great Scotland Yard).

Semantic features

In Chapter 4, we observed that many words can be decomposed into morphemes, the most basic units of meaning. However, it is possible to find a more basic set of **semantic features** or properties that comprise some of the meaning of a word or morpheme and that clarify how certain words relate to other words. For example, two words can be antonyms only if they share a principal semantic feature in which they differ. The antonyms *wet* and *dry* share, but differ in, the feature 'liquid'. Similarly, *buy/sell* are relational opposites because both contain a semantic feature, such as 'change in possession', and differ only in the direction of the change. On the other hand, *big* and *red* are not antonyms because the principal feature of one is 'size' and of the other 'colour'.

Semantic features are among the conceptual elements that contribute to the meanings of words and sentences. Consider the sentence:

The assassin killed Thwacklehurst.

If the word *assassin* is in your mental dictionary, you know that it was some person who murdered some *important person* named Thwacklehurst. Your knowledge of the meaning of *assassin* tells you that an animal did not do the killing, and that Thwacklehurst was not an average citizen. Knowledge of *assassin* includes knowing that the individual to whom that word refers is human, is a murderer, and is a killer of important people. These bits of information are among the semantic features of the word that speakers agree on. The meaning of all nouns, verbs, adjectives, and adverbs – the open class content words – and even of some of the closed class words, such as *with* and *over*, can at least partially be specified by such features.

Evidence for semantic features

Semantic features are not directly observable. Their existence must be inferred from linguistic evidence. One source of such evidence is the speech errors, or slips of the tongue, that we all produce. Consider the following unintentional word substitutions that some speakers have actually spoken.

Intended utterance	Actual utterance (error)
bridge of the nose	bridge of the neck
when my gums bled	when my tongues bled
he came too late	he came too early
Mary was young	Mary was early
the lady with the dachshund	the lady with the Volkswagen
that's a horse of another colour	that's a horse of another race
his ancestors were farmers	his descendants were farmers
he has to pay her alimony	he has to pay her rent

These errors and thousands of others that have been collected and catalogued reveal that the incorrectly substituted words are not random substitutions but share some semantic feature with the intended words. (We will continue to indicate words by using *italics* and semantic features by single quotes.) *Nose*, *neck*, *gums* and *tongues* are all 'body parts' or 'parts of the head'. *Young*, *early* and *late* are related to 'time'. *Dachshund* and *Volkswagen* are both 'German' and 'small'. The shared semantic features of *colour* and *race, ancestor* and *descendant*, and of *alimony* and *rent* are apparent.

The semantic properties that describe the linguistic meaning of a word should not be confused with other non-linguistic properties, such as physical properties. Scientists know that water is composed of hydrogen and oxygen, but such knowledge is not part of a word's meaning. We also know that water is an essential ingredient of lemonade and baths. We do not need to know any of these things, though, to know what the word *water* means, and to be able to use and understand this word in a sentence.

Semantic features and grammar

Further evidence that words are composed of smaller bits of meaning is that semantic features interact with different aspects of grammar, such as the morphology or syntax. These effects show up in both nouns and verbs.

Semantic features of nouns

The same semantic feature may be shared by many words. 'Female' is a semantic feature, sometimes indicated by the bound suffix *-ess*, which makes up part of the meaning of nouns such as:

tigress	waitress	goddess
actress	princess	adulteress
poetess	hostess	baroness

In some languages, though not English, nouns occur with **classifiers**, grammatical morphemes that mark their semantic class. In Swahili, for example, a noun that has the semantic feature 'human' is marked with a prefix *m-* if singular and *wa-* if plural, as in *mtoto*, 'child', and *watoto*, 'children'. On the other hand, a noun that has the feature 'human artefact', such as *bed*, *chair* or *knife*, is marked with the classifier *ki* if singular and *vi* if plural, for example, *kiti*, 'chair' and *viti*, 'chairs'.

classifier
A grammatical morpheme that marks the semantic class of a noun.

Semantic features may have syntactic and semantic effects, too. In English and many (though not all) languages, the kinds of determiners that a noun may occur with are controlled by whether it is a 'count' noun or a 'mass' noun. Consider the following:

I have two dogs.	*I have two rice(s).
I have a dog.	*I have a rice.
*I have dog.	I have rice.
He has many dogs.	*He has many rice(s).
*He has much dogs.	He has much rice.

Count nouns can be enumerated and pluralised – *one potato*, *two potatoes*. They may be preceded by the indefinite determiner *a*, and by the quantifier *many* as in *many potatoes*, but not by *much*, **much potato*. They must also occur with a determiner of some kind. Nouns such as *rice*, *water* and *milk*, which cannot be enumerated or pluralised, are **mass nouns**. They cannot be preceded by *a* or *many*, and they can occur with the quantifier *much* or without any determiner at all. The count/mass distinction captures the fact that speakers have judgements about the grammaticality of different determiner types with different nouns. Without it we could not describe these differences.

count noun
A noun that can be enumerated, e.g. *one potato*, *two potatoes*.

mass noun
A noun that cannot ordinarily be enumerated, e.g. *milk*, *water*; **two milks* is **ungrammatical** except when interpreted to mean 'two kinds of milk', 'two containers of milk' and so on.

Generally, the count/mass distinction corresponds to the difference between discrete objects and homogeneous substances. But it would be incorrect to say that this distinction is grounded in human perception, because different languages may treat the same object differently. In English, the words *furniture* and *spaghetti* are mass nouns, and we say *Much furniture is poorly* *made* or *John loves spaghetti*. In Italian, however, these words are count nouns, as illustrated in the following sentences:

Piero ha comprato un mobile.

Piero bought a furniture.

Ivano ha mangiato molti spaghetti ieri sera.

Ivano ate many spaghettis last evening.

We would have to assume a radical form of linguistic determinism to say that Italian and English speakers have different perceptions of furniture and spaghetti. It is more reasonable to assume that languages can differ to some extent in the semantic features they assign to words with the same referent, somewhat independently of the way they conceptualise that referent. Even within a particular language we can have different words – *count* and *mass* – to describe the same object or substance. In English we have, for example, *shoes* (count) and *footwear* (mass), *coins* (count) and *change* (mass).

Semantic features of verbs

cause/causative
The thematic role of the noun phrase whose referent is a natural force that is responsible for a change, e.g. *The wind* in *The wind damaged the roof*.

Verbs can also have semantic features as part of their meaning; for example, '**cause**', is a feature of verbs such as *darken*, *kill*, *beautify* and so on.

darken	cause to become dark
kill	cause to die
beautify	cause to become beautiful

'Go' is a feature of verbs that mean a change in location or possession, such as *swim*, *crawl*, *throw*, *fly*, *give* or *buy*:

Jack swims.

The baby crawled under the table.

The boy threw the ball over the fence.

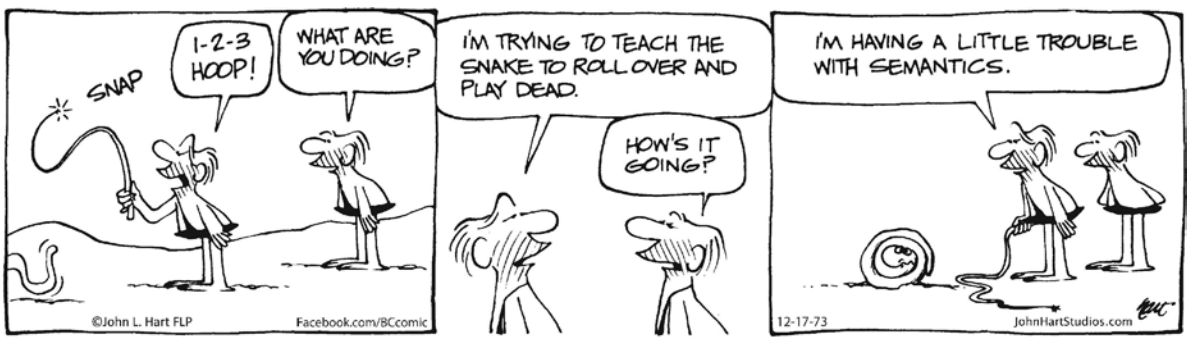
John gave Mary a beautiful engagement ring.

Words such as *swim* have an additional feature such as 'in liquid', while *crawl* is 'close to a surface'.

'Become' is a feature expressing the end state of the action of certain verbs. The verb *break*, for example, can be broken down into the following components of meaning: 'cause' to 'become' broken.

The humour of the cartoon in **Figure 6.1** is that the verb *roll over* has a specific semantic feature, something like 'activity about the longest axis'. The snake's attempt to roll about its shortest axis indicates trouble with semantic features.

Figure 6.1 **Semantic features**



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Semantic features of verbs, like features on nouns, may have syntactic consequences. For example, verbs can describe either **events**, such as *John kissed Mary/John ate oysters*, or **states**, such as *John knows Mary/John likes oysters*. The eventive/stative difference is mirrored in the syntax. Eventive sentences sound natural when passivised, when expressed progressively, when used imperatively, and with certain adverbs:

event/eventive
A type of sentence that describes activities, such as *John kissed Mary*, as opposed to describing states, such as *John knows Mary*.

state/stative
A type of sentence that describes a state of being, such as *Mary likes oysters*, as opposed to describing an event, such as *Mary ate oysters*.

Eventives	
Mary was kissed by John.	Oysters were eaten by John.
John is kissing Mary.	John is eating oysters.
Kiss Mary!	Eat oysters!
John deliberately kissed Mary.	John deliberately ate oysters.

The stative sentences seem peculiar, if not ungrammatical or anomalous, when cast in the same form. (The preceding '?' indicates the strangeness.)

Statives	
?Mary is known by John.	?Oysters are liked by John.
?John is knowing Mary.	?John is liking oysters.
?Know Mary!	?Like oysters!
?John deliberately knows Mary.	?John deliberately likes oysters.

Negation is a particularly interesting component of the meaning of some verbs. Expressions such as *ever*, *any more*, *budge an inch* and many more are ungrammatical in certain simple affirmative sentences, but grammatical in corresponding negative ones.

*Mary will ever smile. (Cf. Mary will not ever smile.)

*I can visit you anymore. (Cf. I cannot visit you anymore.)

Such expressions are called 'negative polarity' items because a negative feature elsewhere in the sentence allows them to appear. Consider these data:

*John thinks that he'll ever fly a plane again.

*John hopes to ever fly a plane again.

John doubts that he'll ever fly a plane again.

John refuses to ever fly a plane again.

This suggests that verbs such as *doubt* and *refuse*, but not *think* and *hope*, have 'negative' as a component of their meaning. *Doubt* may be analysed as 'think that not', and *refuse* as 'intend not to'. The negative feature in the verb allows the negative polarity item *ever* to occur grammatically without the overt presence of *not*.

Even rather subtle differences in a verb's semantic features can affect the syntactic operations that apply to sentences. For example, consider the following:

1 John threw/tossed/kicked/flung the ball to the boy.
2 John threw/tossed/kicked/flung the boy the ball.
3 John pushed/pulled/lifted/hauled the ball to the boy.
4 *John pushed/pulled/lifted/hauled the boy the ball.

The verbs in (1) can be rearranged as in (2). The verbs in (3) are also ditransitive. However, these verbs do not allow the rearrangement of their arguments, as indicated by the ungrammatical examples in (4). Though the verbs in (1) and (3) are all verbs of motion, they differ in how the force of the motion is applied: the verbs in (1) involve a single quick motion whereas those in (3) involve a prolonged use of force. This semantic difference gives rise to different word order possibilities.

Similarly, in the following:

5 Mary faxed/radioed/e-mailed/phoned the news to Helen.
6 Mary faxed/radioed/e-mailed/phoned Helen the news.
7 Mary murmured/mumbled/muttered/shrieked the news to Helen.
8 *Mary murmured/mumbled/muttered/shrieked Helen the news.

The verbs in (5) and (7) are verbs of communication, but their meanings differ in the way the message is communicated; those in (5) involve an external apparatus whereas those in (7) involve the type of voice used. The verbs in (5) allow their arguments to be rearranged, as in (6), while the verbs in (7) do not.

The verbs in (1) to (8) all have the feature 'transfer'. The to-be-transferred argument is the direct object, while the recipient of the transfer is the indirect object. In (1) the ball is transferred to the boy. In (5) the news is transferred, or leastwise transmitted, to Helen. Even when the transference is not overt, it may be inferred. In *John baked Mary a cake*, there is an implied transfer of the cake from John to Mary. A subtle difference in the manner of transfer affects the syntax of these verbs, and indeed, this connection between form and meaning may help children acquire the syntactic and semantic rules of their language, as will be discussed in Chapter 7.

Argument structure and thematic roles

Verbs also differ in terms of the number and types of phrases they can take as complements and/or adjuncts. As we noted in Chapter 5, transitive verbs (e.g. *find*, *hit* and *chase*) take, or c-select, a direct object complement, whereas intransitive verbs (e.g. *arrive* or *sleep*) do not take a complement at all. Ditransitive verbs (e.g. *give* or *throw*) take two object complements, as in *John threw Mary a ball*. In addition, most verbs take a subject. The various NPs that occur with a verb are its **arguments**. Therefore, intransitive verbs have one argument – the subject; transitive verbs have two arguments – the subject and direct object; ditransitive verbs have three arguments – the subject, direct object and indirect object. The **argument structure** of a verb is part of its meaning and is included in its lexical entry.

arguments
The various NPs that occur with a verb, e.g. *Jack* and *Jill* are arguments of *loves* in *Jack loves Jill*.

argument structure
The various NPs that occur with a particular verb, called its arguments, e.g. **intransitive** verbs take a subject NP only; **transitive** verbs take both a subject and direct object NP.

thematic role
The semantic relationship between the verb and the noun phrases of a sentence, such as agent, theme, location, instrument, goal, source.

The verb not only determines the number of arguments in a sentence, but it also determines the **thematic roles** of its arguments. Thematic roles express the kind of semantic relation that holds between the arguments of the verb and the type of situation that the verb describes. For example, in the following sentence the NP *the boy*:

1 The boy rolled a red ball.
agent theme

is the 'doer' of the rolling action, also called the agent. The NP *a red ball* is the theme or the 'undergoer' of the rolling action. Relations such as agent and theme are thematic roles.

A further example is the sentence:

2 The boy threw the red ball to the girl
agent theme goal

Here, *the girl* bears the thematic role of goal, that is, the endpoint of a change in location or possession. The VP is interpreted to mean that the theme of *throw* ends up in the position of the goal.

Other thematic roles are source, where the action originates; instrument, the means used to accomplish the action; and experiencer, one receiving sensory input:

3 Professor Snape awakened Harry Potter with his wand.
agent experiencer instrument

The particular thematic roles assigned by a verb can be traced back to components of the verb's meaning. Verbs such as *throw*, *buy*, and *fly* contain a feature 'go' expressing a change in location or possession. The feature 'go' is thus linked to the presence of the thematic roles of theme, source, and goal. Verbs such as *awaken* or *frighten* have a feature 'affects mental state' so that one of its arguments takes on the thematic role of experiencer.

Thematic role assignment, or **theta assignment**, is also connected to syntactic structure. In the sentence in (2), the role of theme is assigned to the direct object *the red ball* and the role of goal to the indirect object *the girl*. Verb pairs such as *sell* and *buy* as in the following sentences (4) and (5):

theta assignment The ascribing of thematic roles to the syntactic elements in a sentence.

4 John sold the book to Mary.
agent theme goal

5 Mary bought the book from John.
agent theme source

both involve the feature 'go'. They are therefore linked to a thematic role of theme, which is assigned to the direct object.

In addition, *sell* is linked to the presence of a goal (i.e. the recipient or endpoint of the transfer), and *buy* is linked to the presence of a source (i.e. the initiator of the transfer). Thus, *buy/sell* are relational opposites because both contain the semantic feature 'go' (i.e. the transfer of goods or services) and they differ only in the direction of transfer, that is, whether the indirect object is a source or goal. Thematic roles are not assigned to arguments randomly. There is a connection between the meaning of a verb and the syntactic structure of sentences containing the verb.

Our knowledge of verbs includes their syntactic category, which arguments they select, and the thematic roles they assign to their arguments. The thematic roles assigned by a particular verb to its arguments are constant even though the arguments may show up in different s-structure positions:

6 The dog bit the stick/The stick was bitten by the dog.

7 The trainer gave the dog a treat/The trainer gave a treat to the dog.

In both sentences in (6), *the dog* is the agent and *the stick* is the theme. Similarly in (7), *the treat* is the theme and *the dog* is the goal. This is because thematic roles are always assigned to the same d-structure position: for example, theme is assigned to the object of *bit/bitten*. The arguments then carry their theta roles with them when they move to a different s-structure position owing to syntactic rules. Our linguistic intuition that the two sentences in (6) and the two sentences in (7) are related to each other is due to the fact that *the stick* in the passive sentence *the stick was bitten by the dog* originated in object position in d-structure and moved to subject position in s-structure by a syntactic rule:

8 ___ was bitten the stick by the dog → the stick was bitten ___ by the dog
d-structure s-structure

Thus, the sentence pairs in (6) and (7) express the same semantic relationships between the verb and its arguments.

Even in cases in which not all the arguments of a verb are expressed, the theta roles for the realised NPs are constant, as the following examples illustrate:

9 The boy opened the door with the key.

10 The key opened the door.

11 The door opened.

In all three of these sentences, *the door* is the theme, the object that is opened. Thus, *the door* in (11) originates as the object of *open* in d-structure and undergoes a movement rule, much like in the passive example above.

___ opened the door → The door opened ___

Although the sentences in (9) to (11) are not strict paraphrases of one another, they are structurally and semantically related in that they have similar d-structure configurations. Indeed, sentence (9) entails (10) and (11), and (10) entails (11).

In the sentences in (9) and (10), *the key*, despite its different s-structure positions, has the thematic role of instrument, suggesting that these sentences also have a similar d-structure configuration. The semantics of the three sentences are determined by the meaning of the verb *open* and the rules that determine how thematic roles are assigned to the verb's NP arguments.

Pragmatics

We have just discussed lexical semantics (i.e. the literal meanings of words) and compositional semantics (the literal meaning of sentences). We described the latter in terms of truth conditions. The idea is that you know what a sentence means if you know what the world would have to look like in order for that sentence to be true.

Literal meaning is not the only sort of meaning we use when we use language to communicate with others. Some meaning is extra-truth-conditional – it comes about as a result of how a speaker uses the literal meaning in conversation, or as a part of a **discourse**. The study of extra-truth-conditional meaning is pragmatics.

discourse
A linguistic unit that usually comprises more than one sentence.

Just as artists depict scenes with representations that are not 100 per cent explicit, language users describe states of affairs with sentences that are not 100 per cent explicit. And just as there are a number of reasons an artist might choose a sketch or an abstract painting to depict a scene (instead of a photograph), there are a number of reasons a speaker might choose a particular sentence or discourse to describe a state of affairs. In what follows we will discuss different ways in which speakers can invoke meaning without expressing it literally.

Speakers know how to combine words and phrases to form sentences, and they also know how to combine sentences into a larger discourse to express complex thoughts and ideas.

Discourse analysis is concerned with the broad speech units comprising multiple sentences. It involves questions of style, appropriateness, cohesiveness, rhetorical force, topic/subtopic structure and differences between written and spoken discourse, as well as grammatical properties.

discourse analysis
The study of **discourse**.

Pronouns and other deictic words

One way in which context can supplement a less-than-explicit sentence meaning is through words that receive part of their meaning via context and the orientation of the speaker. Such words are called **deictic** and include pronouns (*she*, *it*, *I*), demonstratives (*this*, *that*), adverbs (*here*, *there*, *now*, *today*), prepositions (*behind*, *before*) and complex expressions involving such words (*those towers over there*).

deictic/deixis
Refers to words or expressions whose reference relies entirely on context and the orientation of the speaker in space and time.

Imagine both sets of sentences in (1) being spoken by Arnold Schwarzenegger in Venice on 11 December 2014.

1 a Arnold Schwarzenegger really likes it in Venice. On 11 December 2014, there was a boat parade in the canals in Venice. On 12 December 2014, an art festival will be held. The art festival on 12 December 2014 will be extremely fun.
  b I really like it in Venice. Today, there was a boat parade in the canals here. Tomorrow an art festival will be held. It will be extremely fun.

The difference between (1a) and (1b) is that (1a) is extremely explicit, while (1b) relies on deictic terms to determine part of the meaning of the sentences. Because our use of language is relatively inexplicit, we are used to interpreting such terms so that (1b) sounds perfectly natural. In fact, it probably will sound more natural to you than (1a), as we are entirely accustomed to using these shortcuts.

And this is despite the fact that we often have to look to context to determine the reference of a pronoun. While proper nouns like *12 December 2014* and *Arnold Schwarzenegger* have context-independent meanings, which means that they will always pick out the same referents regardless of the context, other words like *here* and *tomorrow* have context-dependent meanings; their reference is determined in part by the context in which they are uttered. We say 'in part' because the particular deictic word itself helps provide restrictions on its own referent. *Here* and *there* have locations as referents; *then* and *now* are temporal referents; *he* and *she* have human referents, and *I* is extremely restrictive: it can only refer to the speaker.

Even though the referent of a pronoun is lexically restricted, we need to look to the context in which the pronoun is uttered to determine the referent. This process is called **reference resolution**. There are two types of context relevant for the resolution of a pronoun: linguistic and situational. **Linguistic context** is anything that has been uttered in the discourse prior to or along with the pronoun. **Situational context** is anything non-linguistic.

Pronouns are lexical items that get their meaning from other NPs in the sentence or in the larger discourse. In other words, pronouns are sensitive to syntax and context for their interpretation.

reference resolution
In computational pragmatics, the computer algorithms that determine when two expressions have the same referent; also the mental process determining the referent of a pronoun or other kind of deictic word or phrase.

linguistic context
The discourse that precedes a phrase or sentence that helps clarify meaning.

situational context
Knowledge of who is speaking, who is listening, what objects are being discussed and general facts about the world we live in, used to aid in the interpretation of meaning.

Pronouns and situational context

Situational context often takes the form of a gesture, like pointing or nodding, as in *He went that way!* or *Who **is** that masked man?* Similarly, *next week* has a different reference when uttered today than a month from today. If you found an undated notice announcing a 'BIG SALE NEXT WEEK', you would not know whether the sale had already taken place.

Directional terms such as:

before/behind	left/right	front/back

are deictic insofar as you need to know the orientation in space of the conversational participants to know their reference. In Japanese the verb *kuru*, 'come', can only be used for motion towards the speaker. A Japanese speaker cannot call up a friend and ask

May I kuru to your house?

as you might, in English, ask 'May I come to your house?' The correct verb is *iku*, 'go', which indicates motion away from the place of utterance. In Japanese, these verbs have a deictic aspect to their meaning. The verbs *come* and *go* have somewhat of the same effect in English. If someone says 'A thief came into the house' versus 'A thief went into the house', you would assume the speaker to have been in the house in the first case, and not in the house in the second.

Pronouns and linguistic context

There are two different ways in which the reference of a pronoun can be resolved by the linguistic context. The first is sentence-internal; the second is sentence-external. We will illustrate the first way by discussing **reflexive pronouns**.

A reflexive pronoun is a sort of pronoun that needs to receive its reference via linguistic context, and more specifically by sentence-internal linguistic context. In other words, it requires that the sentence contain another NP – an **antecedent** – that it can co-refer with. In English, reflexive pronouns end with *-self* or *-selves*, like *himself* or *themselves*. (2a) shows that a reflexive pronoun requires an antecedent in the sentence. (2b) shows that a reflexive pronoun must match the person, gender and number of its antecedent.

2 a *Herself left.
  b *John wrote herself a letter.

reflexive pronoun
A pronoun ending with *-self* that generally requires a noun-phrase antecedent within the same S, e.g. *myself*, *herself*, *ourselves*, *itself*.

antecedent
A noun phrase with which a pronoun is **coreferential**.

Interestingly, the restriction on reflexive pronouns is even stronger than (2) suggests. It is not enough that they have a matching antecedent in the sentence, but that antecedent must be in the right position with respect to the co-referring reflexive pronoun. (3a) shows that the antecedent must precede the reflexive pronoun. (3b) shows that there cannot be another NP in between a reflexive pronoun and its antecedent.

3 a *Himself washed John.
 b *Jane said the boy bit herself.

Thus one of the things that you know when you know English is that pronouns can receive their reference from their linguistic context. You also know that some pronouns – reflexive pronouns – are particularly picky. Their reference can only be resolved if they have an antecedent which is nearby in the right sort of way.

Non-reflexive pronouns (which we will refer to simply as pronouns), such as *he*, *she*, *him*, *her*, *it*, also have their reference resolved via linguistic context. These pronouns can have their antecedent in another, preceding sentence. This is demonstrated in (4):

4 Sue likes pizza. She thinks it is the perfect food.

Moreover, the antecedent does not even have to be in a sentence spoken by the same speaker. In the discourse in (5), Mary uses a deictic adverb (*there*) whose antecedent is in Sue's utterance.

5 *Sue*: I just got back from Rome.
 Mary: I've always wanted to go there!

Depending on the context and the discourse, an antecedent can even be several sentences away from its co-referring pronoun. Indeed, language users are adroit at processing sentences with several different pronouns and their different antecedents. Consider the discourse in (6):

6 *John*: It seems that the man loves the woman.
 Bill: Many people think he loves her.

A natural interpretation of Bill's utterance is one in which *he* co-refers with *the man* in John's utterance and *she* co-refers with *the woman* in John's utterance. This is a classic case of reference resolution via linguistic context.

But now read Bill's utterance (6) out loud and put emphasis on *her*. When *her* is emphasised it seems more natural to fix its referent from the situational context. In other words, if Bill were to emphasise *her*, it would seem as though *her* would co-refer with some woman in the non-linguistic context different from the woman John had in mind. This utterance – with *her* emphasised – seems natural for a situation in which Bill is pointing at some other woman across the room.

Language users tend to use pronouns to refer to individuals in contexts – linguistic or situational – in which the referent of the pronoun is clear. Exactly which referent the pronoun receives is constrained by a number of different factors, including the gender- and number-marking on the pronoun, whether or not the pronoun is reflexive, and what linguistic and situational contexts the pronoun is uttered in.

Implicature

> What does 'yet' mean, after all? 'I haven't seen *Reservoir Dogs* yet.' What does that mean? It means you're going to go, doesn't it?
>
> Nick Hornby, *High Fidelity*, 1995

Pronouns are an example of how the context in which a sentence is uttered can help fix the meaning of that sentence. There is another way in which context can play a role in meaning: it can supplement the meaning of a sentence. Consider the following examples of conversational **implicatures**:

7 *Sue*: Does Dave have a girlfriend?
Bill: He's been driving to Adelaide every weekend.
8 *Jane*: Do you know how to change a tyre?
John: I know how to call a tow truck.
9 *Dana*: Do these slacks make my butt look big?
Jamie: You look great in chartreuse.

In (7), Bill asserts that Dave has been driving to Adelaide every weekend. But he implicates that Dave has a girlfriend (and that the girlfriend lives in Adelaide). In (8), John asserts that he knows how to call a tow truck. But he implicates that he does not know how to change a tyre. In (9) – well, you figure it out.

These discourses should seem fairly natural to you. And it is likely that you calculated the same implicatures we did. That is what linguists find interesting. Just as morphology, syntax and semantics are rule-governed, as we have emphasised throughout this book, so is pragmatics (and, by extension, implication).

implicatures/ implication
A way in which some linguists describe presupposition, e.g. *John wants more coffee* carries the implication or **entails** that John has already had some coffee; see also **entailment**, **presupposition**.

Maxims of conversation

> Though this be madness, yet there is method in't.
>
> Shakespeare, *Hamlet*, c. 1600

The most notable effort made to formulate pragmatic rules is found in the work of the British philosopher H Paul Grice. He attempted to formalise what we know when we know how to perceive implicature in a conversation. He concluded that language users can calculate implicatures because they are all following some implicit principles (and each language user can therefore assume that others are following those principles). Grice called these principles 'maxims' of discourse and used them to serve as the foundation of pragmatics, the study of extra-truth-conditional meaning. These are listed with examples in **Table 6.1**.

Table 6.1 Grice's maxims of conversation

Maxim	Example
Maxim of quality: Truth	Do not say what you believe to be false.
	Do not say that for which you lack adequate evidence.
Maxim of quantity: Information	Make your contribution as informative as is required for the current purposes of the exchange.
	Do not make your contribution more informative than is required.
Maxim of relation: Relevance	Be relevant.
Maxim of manner: Clarity	Avoid obscurity of expression.
	Avoid ambiguity.
	Avoid unnecessary wordiness.
	Be orderly.

These are not prescriptive rules but rather part of a strategy used by the community of language users to enable the use of conversational implicature. They tend to be violated only by uncooperative people. (The maxims are sometimes referred to *en masse* as Grice's **cooperative principle**.) So if John stops Mary on the street and asks her for directions to the library, and she

cooperative principle
A broad principle within whose scope fall the various maxims of conversation. It states that in order to communicate effectively, speakers should agree to be informative and relevant.

responds 'Walk up three streets and take a left', it is a successful discourse only because Mary is being cooperative (and John assumes Mary is being cooperative). In particular, John assumes that Mary is following the maxim of quality.

On the other hand, the following discourse (from *Hamlet*, Act II, Scene ii), which gave rise to Polonius' aforementioned remark, does not seem quite right – it is not coherent, for reasons that Grice's maxims can explain.

Polonius:	What do you read, my lord?
Hamlet:	Words, words, words.
Polonius:	What is the matter, my lord?
Hamlet:	Between who?
Polonius:	I mean, the matter that you read, my lord.
Hamlet:	Slanders, sir: for the satirical rogue says here that old men have grey beards, that their faces are wrinkled, their eyes purging thick amber and plum-tree gum, and that they have a plentiful lack of wit, together with most weak hams: all which, sir, though I most powerfully and potently believe, yet I hold it not honesty to have it thus set down; for yourself, sir, should grow old as I am, if like a crab you could go backward.

Hamlet, who is feigning insanity, refuses to answer Polonius' questions 'in good faith'. He has violated the maxim of quantity, which states that a speaker's contribution to the discourse should be as informative as is required – neither more nor less. Hamlet has violated this maxim in both directions. In answering 'Words, words, words' to the question of what he is reading, he is providing too little information. His final remark goes to the other extreme in providing too much information (this could also be seen as a violation of the maxim of manner). Hamlet also violates the maxim of relevance when he 'misinterprets' the question about the reading matter as a matter between two individuals.

A maxim is violated when a speaker chooses to be uncooperative for whatever reason.

Implicatures can arise when a maxim is flouted. To flout a maxim is to choose not to follow that maxim in order to implicate something. In the previous *Hamlet* discourse, Hamlet is violating the maxim in order to sound insane. But we can easily imagine a slightly different context, one in which Polonius and Hamlet have more or less the same exchange, but one in which Hamlet is not pretending to be insane.

Polonius:	What do you read, my lord?
Hamlet:	Words, words, words.

In this context, Hamlet is still not obeying the maxim of quantity – he's not saying enough to really answer Polonius' question – but he is instead flouting the maxim to implicate that he does not want Polonius to know what he's reading.

Unless speakers (such as Hamlet) are being deliberately uncooperative, they adhere to these maxims and to other conversational principles and assume others do too.

Bereft of context, if one man says (truthfully) to another, 'I have never slept with your wife', that would be provocative because the very topic of conversation should be unnecessary, a violation of the maxim of quantity.

Asking an able-bodied person at the dinner table 'Can you pass the salt?', if answered literally, would force the responder into stating the obvious, a violation of the maxim of quantity. To avoid this, the person asked seeks a reason for the question and deduces that the asker would like to have the saltshaker.

The maxim of relevance explains how saying 'It's cold in here' to a person standing by an open, draughty window might be interpreted as a request to close it – or else why make the remark to that particular person in the first place?

Implicatures are different than entailments. An entailment cannot be cancelled; it is logically necessary. The truth of *Jon killed Jim* entails that Jim is dead and nothing anyone can say will resurrect him. But further world knowledge or verbal clarification may cancel an implicature.

Presupposition

> 'Take some more tea,' the March Hare said to Alice, very earnestly. 'I've had nothing yet,' Alice replied in an offended tone, 'so I can't take more.' 'You mean you can't take less,' said the Hatter: 'It's very easy to take more than nothing.'
>
> Lewis Carroll, *Alice's Adventures in Wonderland*, 1865

A somewhat different consequence of the maxim of relevance arises for sentences like *I am sorry that the team lost*. To be relevant – to obey the maxim of relevance – it must be true that 'the team lost'. Else why say it? Situations that must exist for utterances to be appropriate are called **presuppositions**.

Questions like *Have you stopped hugging your border collie?* presuppose that you hugged your border collie, and statements like *The river Avon runs through Stratford* presuppose the existence of the river and the town. The presuppositions prevent violations of the maxim of relevance. When presuppositions are ignored, we get the confusion that Alice felt at the tea party. Utterances like 'Take some more tea' or 'Have another beer' carry the presupposition that one has already had some. The March Hare is oblivious to this aspect of language, of which the exasperated Alice is keenly aware.

presupposition
Implicit assumptions about the world required to make an utterance meaningful or appropriate.

Presuppositions hold up under negation. *I am **not** sorry that the team lost* still needs the team to have lost to adhere to the maxim of relevance. If the Mad Hatter had said 'Do not take some more tea' the presupposition of previous tea consumption would still be needed.

Presuppositions are different from implicatures. To cancel a presupposition – 'oh, the team didn't lose after all' – renders the entire utterance 'I'm sorry that the team lost' inappropriate and in violation of Grice's maxims. No such incongruity arises when implicatures are cancelled.

Presuppositions also differ from entailments in that they are taken for granted by speakers adhering to the cooperative principle. Unlike entailments, they remain when the sentence is negated. On the other hand, while *Jon killed Jim* entails *Jim died*, no such entailment follows from *Jon did not kill Jim*.

Speech acts

You can use language to do things such as make promises, lay bets, issue warnings, christen boats, place names in nomination, offer congratulations or swear testimony. The theory of **speech acts** describes how this is done.

speech act
The action that a speaker accomplishes when using language in context, the meaning of which is inferred by hearers, e.g. *There is a bear behind you* may be intended as a warning in certain contexts, or may in other contexts merely be a statement of fact.

By saying 'I warn you that there is a sheepdog in the closet', you not only say something but you also *warn* someone. Verbs such as *bet*, *promise* and *warn* are **performative verbs**. Using them in a sentence (in the first-person, present tense) adds something extra – something over and above the statement.

performative verb
A verb, certain usages of which comprise a **speech act**, e.g. *resign* in the sentence *I resign!* is interpreted as an act of resignation.

There are hundreds of performative verbs in every language. The following sentences illustrate their usage:

I *bet* you five dollars the Wallabies win.

I *challenge* you to a match.

I *dare* you to step over this line.

I *fine* you two-hundred dollars for disobeying the water restrictions.

I *move* that we adjourn.

I *promise* to improve.

I *resign*!

I *pronounce* you husband and wife.

In all of these sentences, the speaker is the subject (i.e. the sentences are in the first person). By uttering the sentence the speaker is accomplishing some additional action, such as daring, challenging or resigning. In addition, all of these sentences are affirmative, declarative and in the present tense. They are typical **performative sentences**.

performative sentence
A sentence containing a performative verb used to accomplish some act. Performative sentences are affirmative and declarative, and are in first person.

An informal test to see whether a sentence contains a performative verb is to begin it with the words *I hereby* ... Only performative sentences sound right when begun this way. Compare *I hereby apologise to you* with the somewhat strange *I hereby know you*. The first is generally taken as an act of apologising. In all of the examples given, insertion of *hereby* would be acceptable.

In studying speech acts, the importance of context is evident. In some situations *There is a sheepdog in the closet* may be a warning, but the same sentence could be a promise or even a mere statement of fact, depending on circumstances. We call this underlying purpose – a warning, a promise, a threat or whatever – the **illocutionary force** of a speech act.

illocutionary force
The effect of a speech act, such as a warning, a promise, a threat or a bet.

Illocutionary force may accompany utterances without overt performative verbs, for example *I've got five bucks that says you're wrong* has the illocutionary force of a bet under appropriate circumstances.

Because the illocutionary force of a speech act depends on the context of the utterance, speech act theory is a part of pragmatics.

Language and thought

> It was intended that when Newspeak had been adopted once and for all and Oldspeak forgotten, a heretical thought – that is, a thought diverging from the principles of IngSoc – should be literally unthinkable, at least so far as thought is dependent on words.
>
> George Orwell, Appendix to *1984*, 1949
>
> The limits of my language mean the limits of my world.
>
> Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, 1922

Sapir–Whorf hypothesis
The notion, associated in the English-speaking world with work by the American scholar Benjamin Whorf and programmatic statements by Edward Sapir, that the semantic structure of the language that a person speaks either determines or limits the ways in which they are able to form conceptions of the world in which they live.

Many people are fascinated by the question of how language relates to thought. It is natural to imagine that something as powerful and fundamental to human nature as language would influence how we think about or perceive the world around us. This is clearly reflected in the appendix of George Orwell's masterpiece *1984*, previously quoted. It is also one of the central themes of the recent science-fiction movie *Arrival* (**Figure 6.2**). Over the years many claims have been made regarding the relationship between language and thought. The claim that the structure of a language influences how its speakers perceive the world around them is most closely associated with the linguist Edward Sapir and his student Benjamin Whorf, and is therefore referred to as the **Sapir–Whorf hypothesis**. In 1929, Sapir wrote:

> Human beings do not live in the objective world alone, nor in the world of social activity as ordinarily understood, but are very much at the mercy of the particular language which has become the medium of expression for their society ... We see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation.[2]

Figure 6.2 **In *Arrival*, Amy Adams plays a linguist asked to decipher a language unlike anything on Earth.**

Alamy Stock Photo/Pictorial Press Ltd

Whorf made even stronger claims:

> The background linguistic system (in other words, the grammar) of each language is not merely the reproducing instrument for voicing ideas but rather is itself the shaper of ideas, the program and guide for the individual's mental activity, for his analysis of impressions, for his synthesis of his mental stock in trade … We dissect nature along lines laid down by our native languages.[3]

The strongest form of the Sapir–Whorf hypothesis is called **linguistic determinism** because it holds that the language we speak determines how we perceive and think about the world. In this view, language acts like a filter on reality. One of Whorf's best-known claims in support of linguistic determinism was that the Hopi people do not perceive time in the same way as speakers of European languages because the Hopi language does not make the grammatical distinctions of tense that, for example, English does with words and word endings, such as *did*, *will*, *shall*, *-s*, *-ed* and *-ing*.

A weaker form of the hypothesis is **linguistic relativism**, which says that different languages encode different categories and that speakers of different languages therefore think about the world in different ways. For example, languages break up the colour spectrum at different points. In Navaho, blue and green are one word. Russian has different words for 'dark blue' (*siniy*) and 'light blue' (*goluboy*), while in English we need to use additional words *dark* and *sky* to express the difference. The Native American language Zuni does not distinguish between the colours yellow and orange.

Languages also differ in how they express locations. In Italian, for example, you ride *in* a bicycle and go *in* a country, while in English you ride *on* a bicycle and go *to* a country. In English we say that a ring is placed *on* a finger and a finger is placed *in* the ring. Korean, on the other hand, has one word for both situations, *kitta*, which expresses the idea of a tight-fitting relation

linguistic determinism
The strongest form of the Sapir–Whorf hypothesis, which holds that the language we speak establishes how we perceive and think about the world.

linguistic relativism
A weaker form of the Sapir–Whorf hypothesis, which holds that different languages encode different categories, and that speakers of different languages therefore think about the world in different ways. Speakers of languages that are poor in their number of colour words, for example, will be less sensitive to gradations of colour.

between the two objects. Spanish has two different words for the inside of a corner (*rincon*) and the outside of a corner (*esquina*).

That languages show linguistic distinctions in their lexicons and grammar is certain, and we will see many examples of this in later chapters. The question is to what extent – if at all – such distinctions determine or influence the thoughts and perceptions of speakers. The Sapir–Whorf hypothesis is controversial, but it is clear that the strong form of this hypothesis is false. People's thoughts and perceptions are not determined by the words and structures of their languages: we are not prisoners of our linguistic systems. If speakers were unable to think about something for which their language had no specific word, translations would be impossible, as would learning a second language. English may not have a special word for the inside of a corner as opposed to the outside of a corner, but we are perfectly able to express these concepts using more than one word. In fact, we just did. If we could not think about something for which we do not have words, how would infants ever learn their first word, much less a language?

Many of the specific claims of linguistic determinism have been shown to be wrong. For example, the Hopi language may not have words and word endings for specific tenses, but the language has other expressions for time, including words for the days of the week, parts of the day, yesterday and tomorrow, lunar phases, seasons and so on. The Hopi people use various kinds of calendars and various devices for time keeping based on the sundial. Clearly, they have a sophisticated concept of time despite the lack of a tense system in the language.

The Munduruku, an indigenous people of the Brazilian Amazon, have no words in their language for triangle, square, rectangle or other geometric concepts, except circle. The only terms to indicate direction are words for upstream, downstream, sunrise and sunset. Yet Munduruku children understand many principles of geometry as well as American children, whose language is rich in geometric and spatial words.

Similarly, although languages differ in their colour words, speakers can readily perceive colours that are not named in their language. Grand Valley Dani, a language spoken in New Guinea, has only two colour words, black and white (dark and light). In experimental studies, speakers of the language were able to learn to recognise the colour red and they did better with fire-engine red than off-red. This would not be possible if their colour perceptions were fixed by their language. Our perception of colour is determined by the structure of the human eye, not by the structure of language. A source of dazzling linguistic creativity is to be found at the local paint store where literally thousands of colours are given names like *soft pumpkin*, *Durango dust* and *lavender lipstick*.

The Whorfian claim that is perhaps most familiar is that the Arctic language Inuit has many more words for snow than does English and that this affects the world view of the Inuit people. However, anthropologists have shown that Inuit has no more words for 'snow' than English does – around a dozen, including *sleet*, *blizzard*, *slush* and *flurry*. But even if it did, this would not show that language conditions the Inuits' experience of the world but rather that experience with a particular world creates the need for certain words. In this respect the Inuit speaker is no different from the computer programmer who has a technical vocabulary for internet protocols, or the linguist who has many specialised words regarding language. In this book we have introduced you to many new words and linguistic concepts, and surely you will learn them! This would be impossible if your thoughts about language were determined by the linguistic vocabulary you now have.

The studies mentioned above show that our perceptions and thoughts are not determined by the words or word endings of our language. But what about the linguistic structures we are accustomed to using? Could these be a strong determinant? In an important study, psychologist Susan Goldin-Meadow and colleagues asked whether the word order of a particular language influences the way its speakers describe an event non-verbally, either with gestures or with pictures. Languages differ in how they encode events; for instance, a person twisting a knob. Speakers of languages like English, Chinese and Spanish typically use the word order actor–action–object (person–twist–knob), whereas speakers of languages like Turkish and Japanese use the order actor–object–action (person–knob–twist). Word order is one of the earliest aspects of language structure that children acquire and it is a fundamental aspect of our linguistic knowledge. Therefore, if language structure strongly influences how we interpret events, then these ordering patterns might show up in the way we describe events even when we are not talking. Goldin-Meadow and colleagues asked adult speakers of English, Turkish and Chinese (Mandarin) to describe vignettes shown on a computer screen using only their hands and also using a set of pictures. Their results showed that all the speakers – irrespective of their language – used the same order in the non-verbal tasks. The predominant gesture order was actor–action–object and the same results were found in the picture-ordering task. Goldin-Meadow and colleagues suggest that there is a universal, natural order in which people cognitively represent events and that this is not affected by the language they happen to speak.[4]

Similar results have been observed between English and Greek speakers. These languages differ in how their verbs encode motion. When describing movement, English speakers will commonly use verbs that focus on the *manner* of motion, such as *slide, skip* and *walk*. Greek speakers, on the other hand, use verbs that focus on the *direction* of the motion, as in *approach* and *ascend*. Measurements of eye movements of these speakers as they verbally describe an event show that they focus on the aspect of the event encoded by their language. However, when freely observing an event but not describing it verbally, they attend to the event in the same ways regardless of what language they speak. These results show that speakers' attention to events is not affected by their language except as they are preparing to speak.

In our understanding of the world, we are certainly not 'at the mercy of whatever language we speak', as Sapir suggested. However, we may ask whether the language we speak *influences* our cognition in some way. In the domain of colour categorisation, for example, it has been shown that if a language lacks a word for, say, red, then it is harder for speakers to re-identify red objects. In other words, having a label seems to make it easier to store or access information in memory. Similarly, experiments show that Russian speakers are better at discriminating light blue (*goluboy*) and dark blue (*siniy*) objects than English speakers, whose language does not make a lexical distinction between these categories. These results show that words can influence simple perceptual tasks in the domain of colour discrimination. Upon reflection, this may not be a surprising finding. Colours exist on a continuum, and the way we segment into different colours happens at arbitrary points along this spectrum. Because there is no physical motivation for these divisions, this may be the kind of situation in which language could show an effect.

The question has also been raised regarding the possible influence of grammatical gender on how people think about objects. Many languages (e.g. Spanish and German) classify nouns as masculine or feminine; in Spanish 'key' is *la llave* (feminine) and 'bridge' is *el puente* (masculine). Some psychologists have suggested that speakers of gender-marking languages think about objects as having gender much like people or animals have. In one study, speakers of German and Spanish (who were proficient in English) were asked to describe various objects using English adjectives. In general they used more masculine adjectives – independently rated as such – to describe objects that are grammatically masculine in their language. For example, Spanish speakers described bridges (*el puente*) with the words *big*, *dangerous*, *long*, *strong* and *sturdy*. In German, the word for 'bridge' is feminine (*die Brücke*) and German speakers used more feminine adjectives such as *beautiful*, *elegant*, *fragile*, *peaceful*, *pretty* and *slender*. Interestingly, it has also been noted that English speakers, too, make consistent judgements about the gender of objects (ships are 'she'), even though English has no grammatical gender on common nouns. It may be, then, that regardless of the language spoken, humans have a tendency to anthropomorphise objects and this tendency is somehow enhanced if the language itself has grammatical gender. Although it is too early to come to any firm conclusions, the results of these and similar studies seem to support a weak version of linguistic relativism.

Politicians and marketers certainly believe that language can influence our thoughts and values. One political party may refer to an inheritance tax as the 'estate tax' while an opposing party refers to it as the 'death tax'. One politician may refer to 'tax breaks for the wealthy' while another refers to 'tax relief'. In the abortion debate, some refer to the 'right to choose' and others to the 'right to life'. The terminology reflects different ideologies, but the choice of expressions is primarily intended to sway public opinion. Politically correct (PC) language also reflects the idea that language can influence thought. Many people believe that by changing the way we talk, we can change the way we think; for example, if we eliminate racist and sexist terms from our language, we will become a less racist and sexist society. As we will discuss in Chapter 9, language itself is not sexist or racist, but people can be and therefore particular words take on negative meanings. In his book *The Language Instinct*, Steven Pinker uses the expression 'the euphemism treadmill' to describe how the euphemistic terms that are created to replace negative words often take on the negative associations of the words they were coined to replace.[5] For example, *handicapped* was once a euphemism for the offensive term *crippled*, and when *handicapped* became politically incorrect it was replaced by the euphemism *disabled*. And as we write, *disabled* is falling into disrepute and is often replaced by yet another euphemism, *challenged*. Nonetheless, in all such cases, it is not clear that changing language has not resulted in a new world view for the speakers.

As prescient as Orwell was with respect to how language could be used for social control, he was more circumspect with regard to the relationship between language and thought. He was careful to qualify his notions with the phrase 'at least so far as thought is dependent on words'. Current research shows that language does not determine how we think about and perceive the world. Future research should show the extent to which language influences other aspects of cognition, such as memory and categorisation.

CHAPTER REVIEW

Summary

Knowing a language means knowing how to produce and understand the meaning of infinitely many sentences. The study of linguistic meaning is called *semantics*. Lexical semantics is concerned with the meanings of morphemes and words, compositional semantics with phrases and sentences. The study of how context affects meaning is called *pragmatics*.

Speakers' knowledge of sentence meaning includes knowing the truth conditions of declarative sentences, knowing when one sentence entails another sentence, knowing when two sentences are paraphrases or contradictory, knowing when a sentence is a tautology, a contradiction or a paradox, and knowing when sentences are ambiguous, among other things. Compositional semantics is the building up of phrasal or sentence meaning from the meaning of smaller units by means of semantic rules.

Words are related in various ways. They may be synonyms, various kinds of antonyms such as gradable pairs and relational opposites, or homonyms, words pronounced the same but with different meanings, such as *bare* and *bear*.

Part of the meaning of words may be described by semantic features, such as 'female', 'young', 'cause' or 'go'. Nouns may have the feature 'count', wherein they may be enumerated (*one potato*, *two potatoes*), or 'mass', in which enumeration may require contextual interpretation (*one milk, *two milks, where *milk* may mean 'one glass or litre or portion of milk'). Some verbs have the feature of being 'eventive' while others are 'stative'. The semantic feature of negation is found in many words and is evidenced by the occurrence of negative-polarity items (e.g. *John doubts that Mary gives a hoot*, but *John thinks that Mary gives a hoot).

Some meaning is extra-truth-conditional: it comes about as a result of how a speaker uses the literal meaning in conversation, or as a part of a discourse. The study of extra-truth-conditional meaning is pragmatics.

Language users generally describe states of affairs with sentences that are not 100 per cent explicit. Context can be used to supplement linguistic meaning in various ways. Context may be linguistic – what was previously spoken – or 'situational'. Deictic terms, such as *you*, *there*, *now* and *the other side*, require knowledge of the situation (person spoken to, place, time, spatial orientation) of the utterance to be interpreted referentially.

Speakers of all languages adhere to various cooperative principles for communicating sincerely, called *maxims of conversation*. Such maxims as 'be relevant' or 'say neither more nor less than the discourse requires' permit speakers to make indirect interpretations of such sentences as *It's cold in here*, in this case to infer 'Shut the window' or 'Turn up the heater'. Implicatures are the inferences that may be drawn from an utterance in context when one or another of the maxims is violated (either purposefully or naively).

The theory of speech acts tells us that people use language to do things such as lay bets, issue warnings or nominate candidates. By using the words 'I nominate Bill Smith', you may accomplish an act of nomination that allows Bill Smith to run for office. Verbs that 'do things' are called performative verbs.

The Sapir–Whorf hypothesis holds that the particular language we speak determines or influences our thoughts and perceptions of the world. Much of the early evidence in support of this hypothesis has not stood the test of time. More recent experimental studies suggest that the words and grammar of a language may affect aspects of cognition such as memory and categorisation.

Exercises

1 (This exercise requires knowledge of elementary set theory.)

a Suppose that the reference (meaning) of *swims* is the set of individuals consisting of Anna, Lu, Paul and Benjamin. For which of the following sentences are the truth conditions produced by semantic rule I met?

i Anna swims.

ii Jack swims.

iii Benjamin swims.

b Suppose the reference (meaning) of *loves* is the set consisting of the following pairs of individuals: <<Anna, Paul>>, <<Paul, Benjamin>>, <<Benjamin, Benjamin>> and <<Paul, Anna>>. According to semantic rule II, what is the meaning of the verb phrase:
   i loves Paul
   ii loves Benjamin
   iii loves Jack?

c Given the information in (b), for which of the following sentences are the truth conditions produced by semantic rule I met?
   i Paul loves Anna.
   ii Benjamin loves Paul.
   iii Benjamin loves himself.
   iv Anna loves Jack.

d **Challenge exercise:** Consider the sentence *Jack kissed Laura*. How would the actions of semantic rules I and II determine that the sentence is false if the following statements were true?
   i Nobody kissed Laura.
   ii Jack did not kiss Laura, although other men did.

2 The following sentences are either tautologies (analytic), contradictions or situationally true or false. Write **T** by the tautologies, **C** by the contradictions and **S** by the other sentences.

a Queens are monarchs.
b Kings are female.
c Kings are poor.
d Queens are ugly.
e Queens are mothers.
f Kings are mothers.
g Dogs are four-legged.
h Cats are felines.
i Cats are stupid.
j Dogs are carnivores.
k Donald Bradman is Donald Bradman.
l Donald Bradman is the first president.
m Donald Bradman is male.
n Uncles are male.
o My aunt is a man.
p Witches are wicked.
q My brother is a witch.
r My sister is an only child.
s The evening star isn't the evening star.
t The evening star isn't the morning star.
u Babies are adults.
v Babies can lift one tonne.
w Puppies are human.
x My bachelor friends are all married.
y My bachelor friends are all lonely.
z Colourless ideas are green.

3 Here is a passage from Lewis Carroll's (1865) *Alice's Adventures in Wonderland*:
On what kinds of pairs of words is the humour of this passage based? Identify each pair.

> 'How is bread made?'
> 'I know that!' Alice cried eagerly.
> 'You take some flour—'
> 'Where do you pick the flower?' the White Queen asked.
> 'In a garden, or in the hedges?'
> 'Well, it isn't picked at all,' Alice explained; 'it's ground—'
> 'How many acres of ground?' said the White Queen.

4 Should the semantic component of the grammar account for whatever a speaker means when uttering any meaningful expression? Defend your viewpoint.

5 a The following sentences may be lexically or structurally ambiguous, or both. Provide paraphrases for each to show you comprehend their meanings. The following is given as an example.

Example:	I saw him walking by the bank.
Meaning 1:	I saw him and he was walking by the bank of the river.
Meaning 2:	I saw him and he was walking by the financial institution.
Meaning 3:	I was walking by the bank of the river when I saw him.
Meaning 4:	I was walking by the financial institution when I saw him.

- i We laughed at the colourful ball.
- ii He was knocked over by the punch.
- iii The police were urged to stop drinking by the fifth.
- iv I said I would file it on Thursday.
- v I cannot recommend visiting professors too highly.
- vi What looks better on a handsome man than a tux? Nothing! (Attributed to actress Mae West.)
- vii Wanted: man to take care of cow that does not smoke or drink. (Actual notice.)
- viii For sale: several old dresses from grandmother in beautiful condition. (Actual notice.)
- ix Time flies like an arrow. (*Hint:* There are at least four paraphrases, but some of them require imagination.)

b Provide paraphrases for each of the following newspaper headlines to show you comprehend their meanings:

- i DRUNK GETS NINE MONTHS IN VIOLIN CASE
- ii SQUAD HELPS DOG BITE VICTIM
- iii LACK OF BRAINS HINDERS RESEARCH
- iv MINERS REFUSE TO WORK AFTER DEATH
- v EYE DROPS OFF SHELF
- vi JUVENILE COURT TO TRY SHOOTING DEFENDANT
- vii QUEEN MARY HAVING BOTTOM SCRAPED

6 Explain the semantic ambiguity of the following sentences by providing two or more sentences that paraphrase the multiple meanings.

Example: She can't bear children can mean either 'She can't give birth to children' or 'She can't tolerate children'.

- a He waited by the bank.
- b Is he really that kind?
- c The proprietor of the fish shop was the sole owner.
- d The long drill was boring.
- e When he got clear title to the land, it was a good deed.
- f It takes a good ruler to make a straight line.
- g He observed that gasoline can explode.
- h You should see her shop.
- i Every man loves a woman.
- j Bill wants to marry a Norwegian woman.

7 Go on an idiom hunt. In the course of some hours in which you converse or overhear conversations, write down all the idioms that are used. If you prefer, watch the soapies or something similar for an hour or two and write down the idioms. Show your parents (or whomever) this book when they find you watching television and you can claim you are doing your homework.

8 Take a half-dozen or so idioms from exercise (7), or elsewhere, and try to find their sources; if you cannot, speculate imaginatively on the source. For example, *sell down the river* meaning 'betray' arose from American slave traders selling slaves from more northern states along the Mississippi River to the harsher southern states. For *snap out of it*, meaning 'pay attention' or 'get in a better mood', we (truly) speculate that ill-behaving persons were once confined in straitjackets secured by snaps, and to snap out of it meant the person was behaving better.

9 For each group of words given below, state what semantic property or properties distinguish between the classes of (A) words and (B) words. If asked, also indicate a semantic property the (A) words and the (B) words share.

Example:	(A) widow, mother, sister, aunt, maid
	(B) widower, father, brother, uncle, valet
	The (A) and (B) words are 'human'.
	The (A) words are 'female' and the (B) words are 'male'.

a (A) bachelor, man, son, paperboy, pope, chief
(B) bull, rooster, drake, ram
The (A) and (B) words are ________
The (A) words are ________
The (B) words are ________

b (A) table, stone, pencil, cup, house, ship, car
(B) milk, alcohol, rice, soup, mud
The (A) words are ________
The (B) words are ________

c (A) book, temple, mountain, road, tractor
(B) idea, love, charity, sincerity, bravery, fear
The (A) words are ________
The (B) words are ________

d (A) pine, elm, ash, weeping willow, gum
(B) rose, dandelion, carnation, tulip, daisy
The (A) and (B) words are ________
The (A) words are ________
The (B) words are ________

e (A) book, letter, encyclopaedia, novel, notebook, dictionary
(B) typewriter, pencil, pen, crayon, quill, charcoal, chalk
The (A) words are ________
The (B) words are ________

f (A) walk, run, skip, jump, hop, swim
(B) fly, skate, ski, ride, cycle, canoe, hang-glide
The (A) and (B) words are ________
The (A) words are ________
The (B) words are ________

g (A) ask, tell, say, talk, converse
(B) shout, whisper, mutter, drawl, yell
The (A) and (B) words are ________
The (A) words are ________
The (B) words are ________

h (A) absent–present, alive–dead, asleep–awake, married–single
(B) big–small, cold–hot, sad–happy, slow–fast
The (A) and (B) words are ________
The (A) words are ________
The (B) words are ________

i (A) alleged, counterfeit, false, putative, accused
(B) red, large, cheerful, pretty, stupid
(*Hint:* Is an alleged murderer always a murderer?)
The (A) words are ________
The (B) words are ________

10 **Challenge exercise:** There are many *-nym*/*-onym* words that describe classes of words with particular semantic properties. We mentioned a few in this chapter, such as synonyms, antonyms, homonyms and hyponyms. What is the etymology of *-onym*? What common English word is it related to? How many more *-nym* words and their meanings can you come up with? Try for five or ten on your own. With help from the internet, dozens are possible.

11 There are several kinds of antonymy. Indicate whether the pairs in columns A and B are complementary, gradable or relational opposites.

A	B
good	bad
expensive	cheap
parent	offspring
beautiful	ugly
false	true
lessor	lessee
pass	fail
hot	cold
legal	illegal
larger	smaller
poor	rich
fast	slow
asleep	awake
husband	wife
rude	polite

12 For each definition write in the first blank the word that has that meaning and in the second (and third if present) a homophone. The first answer is given as an example.

e.g.	a pair	*two*	*too*	*to*
a	naked	b_______	b_______	
b	base metal	l_______	l_______	
c	worships	p_______	p_______	p_______
d	one of five senses	s_______	s_______	c_______
e	several couples	p_______	p_______	p_______
f	purity of gold unit	c_______	c_______	
g	a horse's coiffure	m_______	m_______	
h	sets loose	f_______	f_______	f_______

13 In the text, we noted that English contains many synonymous pairs consisting of a word with an English (or Germanic) root, and another with a Latin root. Fill in the columns below with the appropriate synonym.

	English	Latin
a	_______	purchase
b	ask	_______
c	_______	cognisant
d	begin	_______
e	_______	fraternal
f	build	_______
g	child	_______
h	_______	arrive
i	freedom	_______
j	_______	appear

14 Here are some proper names of restaurants found in the US. Can you figure out the basis for the name?
- a Mustard's Last Stand
- b Aunt Chilada's
- c Lion on the Beach
- d Pizza, Paul and Mary
- e Franks for the Memories
- f Weiner Take All
- g Dressed to Grill
- h Deli Beloved
- i Gone with the Wings
- j Aunt Chovy's Pizza
- k Polly Esther's
- l Thai Me Up Café
- m Romancing the Cone

15 The following sentences consist of a verb, its noun phrase subject and various noun phrases and prepositional phrases. Identify the thematic role of each NP by writing one of the following above it: *agent*, *theme*, *instrument*, *source*, *goal*, and *experiencer*.

Example: agent theme source instrument
The boy took the newspapers from the paper shop with a handcart.

- a Mary found a ball in the house.
- b The children ran from the playground to the wading pool.
- c One of the men unlocked all the doors with a paperclip.
- d John melted the ice with a blowtorch.
- e The sun melted the ice.
- f The ice melted.
- g With a telescope, the boy saw the man.
- h The farmer loaded hay onto the truck.
- i The farmer loaded the hay with a pitchfork.
- j The hay was loaded on the truck by the farmer.

16 Find a complete version of 'Jabberwocky' from *Through the Looking-Glass* by Lewis Carroll. Look up all the nonsense words in a good dictionary and see how many of them are lexical items in English. Note their meanings.

17 In sports and games, many expressions are performative. In cricket the wicketkeeper performs an act by shouting *Howzat!* Think up half a dozen or so similar examples and explain their uses.

18 A criterion of a performative utterance is whether you can begin it with *I hereby*. Notice that if you say sentence (a) aloud, it sounds like a genuine apology, but to say sentence (b) aloud sounds funny because you cannot perform an act of knowing.
- a I hereby apologise to you.
- b I hereby know you.

Determine which of the following sentences are performative sentences by inserting *hereby* and seeing whether they sound right.
- c I testify that she met the agent.
- d I know that she met the agent.
- e I suppose the Wallabies will win.
- f He bet her twenty-five dollars that Abbott would win.
- g I dismiss the class.
- h I teach the class.
- i We promise to leave early.
- j I owe the Australian Taxation Office ten-thousand dollars.
- k I bequeath ten-thousand dollars to the Australian Taxation Office.
- l I swore I didn't do it.
- m I swear I didn't do it.

19 a Explain, in terms of Grice's maxims, the humour or strangeness of the following exchange between mother and child. The child has just finished eating a biscuit when the mother comes into the room.

Mother:	What are these biscuit crumbs doing in your bed?
Child:	Nothing, they're just lying there.

b Do the same for this 'exchange' between an owner and her cat:

Owner:	If cats ruled the world, everyone would sleep on a pile of fresh laundry.
Cat:	Cats don't rule the world??

20 Spend an hour or two observing conversations between people, including yourself if you wish, where the intended meanings of utterances are mediated by Grice's maxims. For example, someone says *I didn't quite catch that*, with the possible meaning of 'Please say it again' or 'Please speak a little louder'. Record five (or more if you are having fun) such instances, and the maxim or maxims involved. In the above example, we would cite the maxims of relevance and quantity.

21 Here is a dialogue excerpt from the 1945 motion picture *The Thin Man Goes Home*. The scene is in a shop that sells paintings and Nick Charles is leaving the shop.

Nick Charles:	Well, thank you very much. Goodbye now.
Shopkeeper:	I beg your pardon?
Nick Charles:	I said, goodbye now.
Shopkeeper:	'Goodbye now?' There's no sense to that! Obviously it's now! I mean, you wouldn't say 'goodbye tomorrow' or 'goodbye two hours ago!'
Nick Charles:	You got hold of somethin' there, brother.
Shopkeeper:	I've got hold of some ... I haven't got hold of anything ... And I'm not your brother!

Analyse this dialogue, intended to be humorous (one assumes), in light of Grice's maxims.

22 a Consider the following 'facts' and then answer the questions:

Roses are red and fuchsias are too.
Paul kissed Paula and Robert, Roberta.
Casca stabbed Caesar and so did Cinna.
Fred was exhausted, as was Sam.

i What colour are fuchsias?
ii What did Robert do to Roberta?
iii What did Cinna do to Caesar?
iv What state was Sam in?

b Now consider these facts.

Black Beauty was a stallion.
Mary is a widow.
John remembered to send Mary a birthday card.
John didn't remember to send Jane a birthday card.
Skippy is flying.

Are the following statements true or false?

i Black Beauty was male.
ii Mary was never married.
iii John sent Mary a card.
iv John sent Jane a card.
v Skippy has wings.

Part (a) illustrates your ability to interpret meanings when syntactic rules have deleted parts of the sentence; part (b) illustrates your knowledge of semantic features and presupposition.

23 The following sentences, when true, have certain entailments even if the situation is not completely known. What are some of them?

Example:	The teenagers promised the police to stop drinking.
Entailments:	The teenagers were drinking. The teenagers communicated with the police.

- a Please take me out to the football match again.
- b Valerie regretted not receiving a new fur coat for Christmas.
- c That her pet turtle ran away made Emily very sad.
- d The administration forgot that the academics support the students.
  (Cf. *The administration believes that the academics support the students*, in which there is no such presupposition.)
- e It is regrettable that the US invaded Cambodia in 1970.
- f Isn't it regrettable that the US invaded Cambodia in 1970?
- g David wants more popcorn.
- h Why don't pigs have wings?
- i Who became prime minister in 1972?

24 Pronouns are so called because they are nouns; they refer to individuals, just as nouns do. The word *pro-form* describes words like *she* in a way that isn't category specific. There are words that function as pro-verbs, pro-adjectives, and pro-adverbs, too. Can you come up with an example of each in English (or another language)?

25 Imagine that Alex and Bruce have a plan to throw Colleen a surprise party at work. It is Alex's job to meet her for lunch at a local restaurant to get her out of the office, and Bruce's job to decorate as soon as she leaves. Alex phones Bruce and says, 'The eagle has landed'. What maxim is Alex flouting? What does his utterance implicate?

26 Each of the following single statements has at least one implicature in the situation described. What is it?

- a *Statement:* You're not made of glass.
  Situation: Someone is blocking your view.
- b *Statement:* I'm starting to feel very tired.
  Situation: You're at a party with a friend and it's 4 a.m.
- c *Statement:* The restaurants shut at 10 p.m.
  Situation: It's 9 p.m. and you haven't eaten dinner.
- d *Statement:* If you'd diet, this wouldn't hurt so much.
  Situation: Someone is standing on your toe.
- e *Statement:* I thought I saw a fan in the closet.
  Situation: It's sweltering in the room.
- f *Statement:* Mr Smith dresses neatly, is well groomed and is always on time to class.
  Situation: The summary statement in a reference for a job applicant.
- g *Statement:* There's hardly any food left.
  Situation: You arrived late at a cocktail party.
- h *Statement:* Someone made a mistake.
  Situation: You're looking over some work done by John and Mary.

27 In each of the following dialogues between Jack and Laura, there is a conversational implicature. What is it?

- a *Jack:* Did you make a doctor's appointment?
  Laura: Their line was busy.
- b *Jack:* Do you have the tickets?
  Laura: Didn't I give them to you?
- c *Jack:* Does your grandmother have a live-in boyfriend?
  Laura: She's very traditional.
- d *Jack:* How did you like the string quartet?
  Laura: I thought the violinist was excellent.

e *Laura:* What are England's chances of winning the Ashes?
Jack: Do cricket balls float?

f *Laura:* Do you own a cat?
Jack: I'm allergic to everything.

g *Laura:* Did you mow the grass and wash the car like I asked you to?
Jack: I mowed the grass.

h *Laura:* Do you want dessert?
Jack: Is the Pope Catholic?

28 a Think of 10 negative polarity items such as *give a hoot*, *give a brass razoo*.
b **Challenge exercise:** Can you think of other contexts without overt negation that 'license' their use? (*Hint:* One answer is discussed in the text, but there are others.)

29 **Challenge exercise:** Suppose that, contrary to what was argued in the text, the noun phrase *no baby* does refer to some individual just like the baby does. It need not be an actual baby but some abstract 'empty' object that we will call '0'. Show that this approach to the semantics of *no baby*, when applying semantic rule I and taking the restricting nature of adverbs into account (everyone who swims beautifully also swims), predicts that *No baby sleeps soundly* entails *No baby sleeps*, and explain why this is wrong.

30 Consider: 'The meaning of words lies not in the words themselves, but in our attitude toward them', spoken by Antoine de Saint-Exupéry (the author of *The Little Prince*). Do you think this is true, partially true or false? Defend your point of view, providing examples if needed.

31 **Challenge exercise:** We observed that ordinarily the antecedent of a reflexive pronoun may not have an intervening NP. Our example was the ungrammatical **Jane said the boy bit herself*. But there appear to be 'funny' exceptions, and many speakers of English find the following sentences acceptable: ?*Yvette said Marcel really loved that sketch of herself that Renoir drew, ?Clyde realised that Bonnie had seen a photo of himself on the wall in the post office.* Investigate and describe what is going on here.

32 Many people are bilingual or multilingual, speaking two or more languages with very different structures.
a What implications does bilingualism have for the debate about language and thought?
b Many readers of this textbook have some knowledge of a second language. Think of a linguistic structure or word in one language that does not exist in the second language and discuss how this does or does not affect your thinking when you speak the different languages. (If you know only one language, ask this question of a bilingual person you know.)
c Can you find an example of an untranslatable word or structure in one of the languages you speak?

33 The South American indigenous language Pirahã is said to lack numbers beyond two and distinct words for colours. Research this language – Google would be a good start – with regard to whether Pirahã supports or fails to support linguistic determinism and/or linguistic relativism.

34 Watch the science-fiction movie *Arrival* and write a short essay on the depiction of the Sapir–Whorf hypothesis in the story. Is it consistent with what you have learnt and discovered about the linguistic relativity hypothesis?

35 English (especially British English) has many words for 'woods' and 'woodlands'. Here are some: *woodlot*, *carr*, *fen*, *firth*, *grove*, *heath*, *holt*, *lea*, *moor*, *shaw*, *weald*, *wold*, *coppice*, *scrub*, *spinney*, *copse*, *brush*, *bush*, *bosquet*, *bosky*, *stand*, *forest*, *timberland* and *thicket*.
a How many of these words do you recognise?
b Look up several of these words in a dictionary and discuss the differences in meaning. Many of these words are obsolete, so if your dictionary does not have them, try the internet.
c Do you think that English speakers have a richer concept of woodlands than speakers whose language has fewer words? Why or why not?

36 **Challenge exercise:** The extent to which language may influence spatial cognition has been a major area of research in linguistics, anthropology and cognitive psychology. Research this topic with particular reference to the different ways languages may express frames of reference and the implication of this variation to the Whorfian hypothesis.

37 **Challenge exercise:** The Natural Semantic Metalanguage approach to meaning assumes that there are a fixed set of semantic primes that are universal and can be identified in every language through empirical investigation. According to the theory, all lexical meaning is built out of these primitive concepts. Research this approach to semantics with an eye for possible criticisms.

38 The following sentences are judged to be ungrammatical by native speakers. Discuss why they are ungrammatical using the concept of thematic relations discussed in the text.

- **a** *The teacher put the book.
- **b** *Put the book on the table. [NB. not in the imperative]
- **c** *The teacher put on the table.
- **d** *The teacher put the book the pencil on the table. [NB. not listed items]

39 In the text we discussed the distinction between eventive and stative verbs. Consider the following verbs and decide which ones are eventive and which ones are stative. Provide evidence for your decision.

- **a** build
- **b** have
- **c** sit
- **d** write
- **e** resemble

40 The following sentences both have the word 'that'. However, this word has different meanings and functions in the two sentences. Identify the meanings and provide evidence for the different meanings/functions.

- **a** Mary thinks that friends should be kind to her.
- **b** Mary thinks that friend should be kind to her.

41 Consider the following scenario and examples (from Wilson & Sperber 2012: 609).

> 'Mary, who dislikes most meat and is allergic to chicken, rings her host to find out what is on the menu. He could truly tell her any of three things':

- **a** We are serving meat.
- **b** We are serving chicken.
- **c** Either we are serving chicken or (72 − 3) is not 46.

  Which of these options is most relevant in the context of maxims of conversation?

Further reading

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Weblinks

- http://www.macmillandictionaryblog.com/a-list-of-metaphors – You can find a list of English metaphors at this Macmillan Dictionary site.
- http://www.natcorp.ox.ac.uk – Here you can obtain up to 50 sample sentences chosen at random from the 100-million-word resources of the British National Corpus.
- https://www.ethnologue.com/subgroups/sign-language – For those interested in sign languages, this is a great site for ethnographic information on sign languages from all over the world.
- http://www.thesaurus.com – This site will give you access to an online thesaurus where you can explore relationships across words, especially those in hyponymic relationships.
- http://www.ling.upenn.edu/courses/Fall_1998/ling001/meaning.html – An introduction to semantics and pragmatics.
- http://www.ello.uos.de/field.php/Pragmatics/PragmaticsPodcasts – At this site, you can learn more about semantics and pragmatics. The site provides a lot of useful exercises, podcasts and other audio files.

- http://wordnet.princeton.edu – Here, English nouns, verbs, adjectives and adverbs are organised into synonym sets, each representing one underlying lexical concept. You can also find a context where each lexical item is used.
- http://filledpause.com – This site is a virtual study hall focusing on various hesitation phenomena, especially filled pauses, in spontaneous speech. If you have ever given a second thought to why human speech is filled with 'uhs' and 'ums', then there's definitely something in this site for you!
- http://courses.nus.edu.sg/course/ellibst/lsl23.html – This site offers you an excellent summary of speech acts and other pragmatic aspects of conversations.

Endnotes

1 From *Complete Poems:* 1904–1962 by E E Cummings, edited by George James Firmage. Used by permission of Liveright Publishing Corporation. *Sonnet entitled how to run the world*. Copyright 1935, © 1963, 1991 by the Trustees for the E E Cummings Trust. Copyright © 1978 by George James Firmage. *A man who had fallen among thieves*. Copyright 1926, 1954, © 1991 by the Trustees for the E E Cummings Trust. Copyright © 1985 by George James Firmage. *Here is little Effie's head*. Copyright 1923, 1925, 1951, 1953, © 1991 by the Trustees for the E E Cummings Trust. Copyright © 1976 by George James Firmage.

2 Sapir, E 1929, *Language*, Harcourt, Brace & World, Inc., New York, p. 207.

3 Carroll, J B (ed.) 1956, *Language, thought, and reality: Selected writings of Benjamin Lee Whorf*, MIT Press, Cambridge, MA, p. 213.

4 Gentner, D and Goldin-Meadow, S 2003, *Language in mind: Advances in the study of language and cognition*, MIT Press, Cambridge, MA.

5 Pinker, S 1994, *The language instinct,* New York: William Morrow.

Part 3

The psychology of language

> The field of psycholinguistics, or the psychology of language, is concerned with discovering the psychological processes that make it possible for humans to acquire and use language.
>
> Jean Berko Gleason and Nan Bernstein Ratner, *Psycholinguistics*, 1993

7 Language acquisition

> The acquisition of language 'is doubtless the greatest intellectual feat any one of us is ever required to perform'.
>
> Leonard Boomfield, *Language*, 1933
>
> The capacity to learn language is deeply ingrained in us as a species, just as the capacity to walk, to grasp objects, to recognise faces. We don't find any serious differences in children growing up in congested urban slums, in isolated mountain villages, or in privileged suburban villas.
>
> Dan Slobin, *The Human Language Series*, program 2, 1994

Learning objectives

After reading Chapter 7, you should be able to:

- explain how usage-based theories and the theory of Universal Grammar differ in their view of children's acquisition of language
- describe children's stages of acquisition (phonological, lexical, morphological, syntactic and pragmatic), noting how usage-based theories and the theory of Universal Grammar differ on how children acquire sentence structure
- understand the similarities in acquiring a spoken language versus a signed language
- explain theories of bilingual language development and how bilingual language development differs from child second-language acquisition.

Language is extremely complex. Yet very young children – before the age of five – already know most of the intricate system that comprises the grammar of a language. Before they can add two and two, blow their nose or tie their shoelaces, children have acquired the syntactic, phonological, morphological and semantic rules of the grammar. The task children undertake is made difficult by the fact that they must figure out the rules of language from noisy data. The linguistic input to children is not made up of perfect full sentences – it consists of sentence fragments, speech errors, interruptions and so on. How do children recreate the grammar of the language of their speech community based on the language they hear around them? Are they guided by innate linguistic knowledge? Or are they able to harness learning mechanisms required for other cognitive abilities to learn the language of their environment?

Children's capacity for language

> We are designed to walk ... That we are taught to walk is impossible. And pretty much the same is true of language. Nobody is taught language. In fact you can't prevent the child from learning it.
>
> Noam Chomsky, *The Human Language Series*, program 2, 1994

Over the years, there have been a number of proposals about the psychological mechanisms that are involved in acquiring language. The central question is: How much of children's linguistic knowledge is learnt from parents and caretakers and how much is innate – hardwired as part of our genetic endowment? This text follows the view that children are born with linguistic knowledge, according to the theory of Universal Grammar (UG), and that this knowledge interacts with linguistic input from parents and caretakers. The innate linguistic knowledge guides children's acquisition of the language that surrounds them, speeding up acquisition and helping children to quickly achieve mastery of the adult grammar. However, it is important to acknowledge that this view of language acquisition is open to debate. The alternative is to deny that children are born with any innate linguistic knowledge and to propose that all of children's knowledge about language is learnt from the environment, that is, from witnessing language 'in use'. Proponents of this usage-based approach to language acquisition propose that children learn language using the general cognitive mechanisms that are used for learning in other cognitive domains. This makes acquiring a language a much more laborious task than if children have innate linguistic knowledge to guide their hypotheses about language.

In what follows, we explore each of these proposals about how children acquire language. We begin with the proposal that language is learnt from the environment, by observing language in use. An important issue in deciding whether or not children can learn language entirely from the input is the issue of corrective feedback. We will investigate whether or not children are corrected for their grammatical errors and whether they use the correction to make their grammar more adult-like. The answer to this question leads to Noam Chomsky's proposal that humans must be endowed with innate linguistic knowledge.

Usage-based language development

Early theories of language development were heavily influenced by behaviourism, a school of psychology prevalent in the 1950s. As the name implies, behaviourism focused on people's behaviours, which are directly observable, rather than on the mental systems underlying these behaviours. B F Skinner, one of the founders of behaviourist psychology, proposed a model of language acquisition in his book *Verbal Behavior* (1957). According to this theory, language was learnt from the environment, as a form of behaviour. It was proposed that children learn language through general cognitive mechanisms, such as analogy, and also through imitation, reinforcement and similar processes. Two years later, in a reply to Skinner, Chomsky argued strongly that language is a complex cognitive system that could not be acquired by behaviourist principles. Although Skinner's theory is no longer considered viable in its original form, there are researchers today who follow in this tradition, claiming that there is no innate component to language. Because researchers who follow this tradition believe that language is acquired by observing it in use, such theories are commonly referred to as 'usage-based' theories of acquisition. One recent usage-based acquisition theory follows the idea that what we learn as adults are sentence 'constructions' rather than hierarchical structures. The constructivist theory of acquisition was introduced by Michael Tomasello[1] and is a current alternative to the theory of UG.

Acquiring constructions

The constructivist theory of language acquisition suggests that children acquire whole utterances or 'constructions' by imitating what they hear, and only later do they learn to dissect them into their parts and acquire their structure. This is because learning theories assume that children are not born with any knowledge of syntactic categories like noun phrase (NP) or verb phrase (VP). The assumption is that children do not have the capability to form the phrase structure rules for their language or have the potential to create new kinds of structures by carrying out transformations (see Chapter 5). Instead, they assume that children have to build up an inventory of similar utterances that they hear in the linguistic input, and gradually try to figure out the rules that underlie them. This is a slow and difficult process, so learning theories generally assume that children are initially very conservative, producing only structures they have heard in the input until they are about three years old. We will discuss this process in more detail in the section on acquisition of syntax.

Mechanisms for learning

Usage-based approaches to language learning, such as the constructivist approach, assume that children learn language using cognitive mechanisms that are used for learning other kinds of cognitive skills, including, for example, imitation and analogy. On this approach to language acquisition, children are initially conservative in what they try to produce but learning mechanisms will be needed later once they need to expand their grammar.

imitation
A proposed mechanism of child language acquisition whereby children learn their language by imitating adult speech in context.

There is little doubt that **imitation** has a role to play in children's successful immersion into a language community. The language input surrounding the child provides the lexicon they need to acquire. Children may try to imitate words they hear and practise them. The question is whether or not children learn their grammatical knowledge from parents by attempting to imitate or approximate their parents' utterances. Usage-based approaches to language acquisition assume that imitation plays an important role. But researchers point out that children do not merely parrot back utterances they have heard. Rather, they try to replicate a linguistic form along with its function; that is, how it was used in context.

Analogy

Analogy is a general learning mechanism used in other cognitive domains. Learning theories often propose that analogy is harnessed for learning language, too. The proposal is that children hear a sentence or sentence pattern and use it as a model to form other sentences. In this way, they expand their grammatical repertoire. Learning theories generally assume that this kind of mechanism is put into use as children get older and need to move beyond conservative use of sentences they have already heard in the surrounding input. It is a very useful mechanism, but the problem with applying analogy to language is that it does not always give the right result, as Lila Gleitman, an expert in developmental psycholinguistics, points out:

> So suppose the child has heard the sentence 'I painted a red barn'. So now, by analogy, the child can say 'I painted a blue barn'. That's exactly the kind of theory that we want. You hear a sample and you extend it to all of the new cases by similarity ... In addition to 'I painted a red barn' you might also hear the sentence 'I painted a barn red'. So it looks as if you take those last two words and switch their order ... So now you want to extend this to the case of seeing, because you want to look at barns instead of paint them. So you have heard, 'I saw a red barn'. Now you try (by analogy) a ... new sentence – 'I saw a barn red'. Something's gone wrong. This is an analogy, but the analogy didn't work. It's not a sentence of English.
>
> Gleitman, L R and Wanner, E, *Language acquisition: The state of the state of the art*, 1982

The analogy does not work in this case because the verbs *paint* and *see* have quite different properties. One problem with analogy as a mechanism for learning language is that it assumes that language rules can be generalised. But language is quirky, and it is not always possible to generalise and fill out all of the cells. This is illustrated with the example about use of the complementiser *that* below:

1 Who do you think Cate likes?
2 Who do you think *that* Cate likes?
3 Who do you think likes Cate?
4 *Who do you think *that* likes Cate?

Suppose a child has heard questions like (1) and (2) above, sometimes with the complementiser, sometimes without. The child concludes that questions are grammatical with the complementiser *that* absent, as in (1), or present, as in (2). Now suppose the child wants to ask a very similar question, but one in which the question word is moved from subject position, rather than object position. Since (1) was fine without the complementiser, the child assumes, by analogy, that (3) is also fine without the complementiser. However, this analogy fails, and would lead the child to produce the ungrammatical question in (4). The issue that arises is how the child would get rid of the ungrammatical question. Do parents provide correction for this kind of grammatical error that would cause the child not to use this particular structure again? The issue of whether or not children are corrected for their grammatical errors is our next topic.

Corrective feedback

The behaviourist tradition of Skinner proposed that children learn to produce correct (grammatical) sentences because they are positively reinforced when they say something right and negatively reinforced when they say something wrong (ungrammatical). Put another way, children receive correction for 'bad grammar', while 'good grammar' is rewarded. This is an important issue, because any linguistic theory must explain how children acquire the mental grammar of their surrounding language. How do they manage to settle on exactly this grammar? Correction for grammatical errors would presumably make it easier to achieve the adult grammar, because children could simply get rid of any 'bad grammar' when it was brought to their attention by parents. But is this kind of correction available to children?

In order to test the proposal that children are corrected when they make grammatical errors, Roger Brown and his colleagues at Harvard University studied parent–child interactions.[2] They reported that reinforcement seldom occurs and when it does, it is usually to correct incorrect pronunciation, or, occasionally, morphological errors, such as saying *goed* as a past tense verb form instead of using the irregular form *went*. But mostly reinforcement is used to correct the content being expressed. They noted, for example, that the ungrammatical sentence *Her curl my hair* was not corrected because the child's mother was in fact curling her hair. However, when a child uttered the syntactically correct sentence *Walt Disney comes on Tuesday*, they were corrected because the Disney television program was shown on Wednesdays, not Tuesdays. Brown and his colleagues conclude that parents focus on the truth value of their children's utterances in determining whether to provide correction or not.

The famous anecdotal dialogue that follows highlights further the fact that children are not sensitive to grammatical correction. In the following examples, we can assume that the child's intended meaning when they say *Nobody don't like me* is 'Nobody likes me'. (In fact, this would be a good sentence in a lot of languages.) The child is confused by the correction about the form of the sentence, since the intended meaning is the same as the meaning expressed by the adult's sentence.

Child:	Nobody don't like me.
Mother:	No, say, 'Nobody likes me'.
Child:	Nobody don't like me.
	(dialogue repeated eight times)
Mother:	Now, listen carefully, say, 'Nobody likes me'.
Child:	Oh, nobody don't likes me.

The research by Brown and his colleagues showed that parents rarely correct grammatical errors by directly pointing out what is wrong with the sentence, as in, 'No, don't say X. Say Y'. Both usage-based researchers who believe that language is learnt and researchers who believe that children are born with innate linguistic knowledge now agree that children do not receive (or make use of) this kind of overt correction for ungrammatical sentences. The question is whether parents provide other sorts of feedback that alert children to their errors.

Usage-based researchers generally argue that the input from parents does contain information that will make children aware of their grammatical errors. For example, parent-child interaction shows that adults often recast children's utterances into an adult-like form, perhaps providing an expansion, asking a confirmation question, or repeating the utterance in its correct form, as in the following examples:

Child	Mother
It fall.	It fell?
Where is them?	They're at home.
It doing dancing.	It's dancing, yes.

In these examples, the mother provides the correct model but does not overtly correct the child. Usage-based researchers argue that children can pick up on these cues. Recasts are helpful to the child in the sense that they contain the adult expression. The difficulty with the proposal that recasts help children acquire the adult grammar is that they are not used in a consistent way. One study of 40 mothers of children aged two to four years showed that only about 25 per cent of children's ungrammatical sentences are recast. Overall, children's grammatical sentences were recast as frequently as their ungrammatical sentences. This inconsistency in the data provided to children makes it difficult for them to know when to pay attention to the recast and use it to fix an ungrammatical utterance and when to ignore it. This suggests that recasts are limited in their use as a mechanism for children to eliminate ungrammatical utterances and move closer to the adult grammar.

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Another suggestion is that children's development of language is facilitated because adults speak to them in a special simplified language called **infant-directed speech (IDS)** (sometimes called 'motherese' or, more informally, 'baby talk'). It is worth pointing out that even if infant-directed speech facilitates language, it does not provide feedback about which utterances are ungrammatical, in other words, it does not provide corrective feedback.

infant-directed speech (IDS)
The special intonationally exaggerated speech that adults sometimes use to speak with young children, sometimes called baby talk or 'motherese'.

In the Western culture, many adults talk to young children using infant-directed speech. Adults often speak more slowly and more clearly, exaggerate their intonation and generally speak in grammatical sentences. An important point is that IDS is not syntactically simpler. It contains a range of sentence types, including syntactically complex sentences, such as questions: *Do you want your juice now?*; embedded sentences: *Mummy thinks you should sleep now*; imperatives: *Pat the dog gently!*; and negatives with tag questions: *We don't want to hurt him, do we?* Also note that adults do not simplify their language by dropping inflections from verbs and nouns or by omitting function words such as determiners and auxiliaries, although children do this all the time. The fact that a range of syntactic structures appear in IDS means that children have sufficient information to extract the rules of their language.

It is also the case that some middle-class parents consciously decide not to use IDS with their babies. There is no evidence that these children do not acquire language in the normal way, so it cannot be that IDS is a necessary condition for language acquisition. In many cultures, adults do not use a special register with children, and there are even communities in which adults hardly talk to babies at all. Children acquire language in much the same way, irrespective of these varying circumstances. Children do not develop because they are exposed to ever more adult-like language. Rather, adults adjust their language to the child's increasing linguistic sophistication. The exaggerated intonation and other properties of IDS may be useful for getting a child's attention and holding it, but it is not thought to be a driving force behind children's acquisition of grammatical structure.

Imitation, analogy and corrective feedback do not seem sufficient to account for children's acquisition of language. Imitation may play a role, but a theory proposing that children learn grammatical properties of language by listening to their parents and trying to replicate their utterances cannot explain the creativity of children's early productions. Children appear to come up with hypotheses about how their language works from early on. As a mechanism for generalisation, analogy can invoke errors, which would need to be eliminated from the grammar. Furthermore, research has revealed that children's grammatical errors are, for the most part, ignored by parents. Parents tend to focus on the content and truth of the message instead. We are left with the question of how children manage to eliminate error and converge on the adult grammar that is shared by the language community. Chomsky's theory of Universal Grammar takes a different approach to this question.

The theory of Universal Grammar

> Language learning is not really something that the child does; it is something that happens to the child placed in an appropriate environment, much as the child's body grows and matures in a predetermined way when provided with appropriate nutrition and environmental stimulation.
>
> Noam Chomsky, *The Human Language Series*, program 2, 1994

Chomsky argued against the idea that our knowledge of language is all learnt. Instead, he argued that children are equipped with an innate template or blueprint for language – Universal Grammar (UG) – and that this blueprint aids the child in the task of constructing a grammar for their language. The proposal that knowledge of language is part of our genetic endowment is referred to as the **innateness hypothesis**.

innateness hypothesis
The theory that the human species is genetically equipped with a **Universal Grammar**, which provides the basic design for all human languages.

We will consider Chomsky's arguments for the innateness of linguistic knowledge in the next section. Researchers who work within this framework point out the following observations. Children are not given explicit information about grammatical rules, by either instruction or correction. They extract the rules of the grammar from the language they hear around them, and their linguistic environment does not need to be special in any way for them to do this. Furthermore, sometimes children's productions clearly do not match what adults say, suggesting that there is a creative component to language acquisition early on. Consider the following examples:

A my pencil

Two foot

What the boy hit?

Other one pants

Mummy get it my ladder

My do it

It could be claimed that in producing *What the boy hit?* the child was attempting to say *What did the boy hit?* and could not memorise the full string of words, but such an argument would not work for examples like *Mummy get it my ladder*, where an extra pronoun *it* has been added, in addition to the NP *my ladder*. The child appears to have gone out of her way to insert the extra word. Researchers who work within the Universal Grammar framework point out that such productions that do not resemble the adult input are a challenge to explain on usage-based approaches to language acquisition.

The innateness hypothesis

> How comes it that human beings, whose contacts with the world are brief and personal and limited, are able to know as much as they do know?
>
> Bertrand Russell, *Human Knowledge: Its Scope and Limits*, 1948

poverty of the stimulus
The argument that children know more about language than they could have learnt from their linguistic experience.

impoverished data
The incomplete, noisy and unstructured utterances that children hear, including slips of the tongue, false starts and ungrammatical and incomplete sentences.

The innateness hypothesis receives its strongest support from the observation that the grammar a person ends up acquiring is vastly underdetermined by linguistic experience. In other words, we end up knowing far more about language than is exemplified in the language we hear around us. This is the argument of the **poverty of the stimulus**.

One observation is that the language input that children receive for their developing grammar is incomplete, noisy and unstructured. We said earlier that IDS is largely well formed, but children are also exposed to adult–adult interactions. These utterances include slips of the tongue, false starts, and ungrammatical and incomplete sentences. In this sense, the data children are exposed to are **impoverished**. Nevertheless, despite the impoverished input that children receive, they all manage to extract the syntactic rules of their language.

There is another sense in which 'the poverty of the stimulus' is used to argue for the innateness of grammatical knowledge. The language that we hear from parents and caretakers informs us about possible sentences and their meanings in our particular language. But, as noted in Chapter 5, all speakers have robust judgements about which sentences are ungrammatical, and what meanings sentences cannot have, again, without any instruction. Everyone agrees that **Who do you think that likes Cate?* is not a grammatical question in English, for example, but nobody is taught this. Negative facts of this kind (i.e. facts about which sentences are *not* grammatical and what meanings sentences *cannot* have) are not available from the language input that is spoken in our environment. Furthermore, as noted, earlier research has shown that children often do not receive corrective feedback about which sentences are ungrammatical. Although there is no information about which sentences and meanings do not form part of the local language, everyone shares judgements about the ungrammaticality of certain sentences. This suggests, according to proponents of the UG theory, that this linguistic knowledge must be hardwired as part of our biology. This kind of negative information is generally formulated as innate principles in the theory of UG.

Principles

Principles, often called constraints, are designed to limit the hypotheses that learners entertain in response to the linguistic data they are presented with in their environment. In so doing, principles prevent language learners from making certain types of errors, and this, in turn, speeds up acquisition of the grammar.

A principle that was introduced in Chapter 5 is the structure dependence principle. This principle ensures that children only construct rules for their language that are based on hierarchical notions; that is, rules that are dependent on the position of constituents in the hierarchical phrase structure. It prevents children from considering hypotheses that are based on linear order. Consider the following examples (note: we use ___ to mark the position from which an auxiliary verb moves.):

1 Is the boy ___ dreaming of a new car?
2 *Is the boy who ___ sleeping is dreaming of a new car?
3 Is the boy who is sleeping ___ dreaming of a new car?

In example (1), the constraint prevents children from coming up with the hypothesis that it is the 'first' auxiliary that should be moved, even though this could be argued to be the simplest hypothesis, and would give the correct result (since there is only one auxiliary verb in the sentence anyway). Instead, the principle guides children to form the question by moving the auxiliary verb from the main clause to a higher position in the structure. This structure-dependent hypothesis also gives the correct result for (1). When it comes to more complex questions, however, the linear hypothesis gives the wrong result. In (2), if the 'first' auxiliary verb is moved, then 'is' will be moved out of the **relative clause** *who is sleeping*, which yields an ungrammatical question.

relative clause
A clause that modifies a noun, e.g. in *See the boy who is carrying an umbrella,* the relative clause restricts our focus to a particular boy, the one *who is carrying an umbrella*.

On the other hand, if the auxiliary verb from the main clause is moved, then children will produce the adult-like question in (3). Thus the constraint helps children to make faster progress in acquiring the adult grammar of their language community.

According to the UG approach to language acquisition, children are not taught about constituent structure. Indeed, adults who have not studied linguistics do not have any explicit knowledge about structure dependence, constituent structure and other abstract properties of grammar and could not instruct their children even if they were so inclined. The input children get is a sequence of sounds, not a set of hierarchical phrase structure trees. An experiment investigating how children ask complex questions like (3) in which the subject NP is modified by a relative clause found that three- to five-year-old children never produce questions like (2). This suggests that the structure dependence principle is guiding children's hypotheses.

Arguments stemming from the 'poverty of the stimulus' have provided strong support for the innateness hypothesis. UG provides children with a significant head start in the task of acquiring the grammar of the language they are surrounded by. As discussed in Chapter 5, on the UG theory, children have innate knowledge of the various syntactic categories, such as NP and VP, and they have the ability to form syntactic rules and to form new structures through syntactic transformations. In addition, universal principles, such as the structure dependence constraint, are in place to help them avoid many grammatical errors. There is one further aspect of UG that helps children acquire their surrounding language with relative ease on this view: the system of parameters.

Parameters

Parameters account for the diversity of languages. They capture the fact that languages differ from each other in systematic ways. They are also designed to reduce the child's grammatical options to a small, well-defined set. Generally, they are formulated as binary options that the child responds to on the basis of input from their language. In reducing children's hypotheses, parameters greatly reduce the acquisition burden on the child and contribute to explaining the ease and rapidity of language acquisition.

Children acquire some aspects of syntax very quickly, even when they are in the two- or three-word stage. Children produce the correct word order of their language in their earliest multiword utterances, and they understand word order even when they are in the one-word stage of production. Some of these early developments are attributed to setting some of the parameters of UG. One such parameter that was discussed in Chapter 5, the head parameter, determines whether the head of a phrase comes before or after its complements; for example, whether the order of the VP is verb–object as in English or object–verb as in Japanese, whether the order of a prepositional phrase is P NP or NP P and so on. According to the parameter model of UG, children choose between two already specified values: head first or head last. They determine the correct value based on the language they hear around them. English-speaking children can quickly figure out that the head comes before its complements; Japanese-speaking children equally well determine that their language is head-final.

Another parameter discussed in Chapter 5 was the *wh*-parameter. This parameter divides languages into those in which the *wh*-phrases move to the highest position in the phrase structure, such as English, and those in which the *wh*-phrase remains in its unmoved position, such as Mandarin or Japanese. It is interesting that children are not reported to make mistakes with this parameter, again suggesting it is set very early.

Other parameters of UG involve the verb movement rules. In some languages the verb can move out of the VP to higher positions in the phrase structure tree. This is true for many of the Romance languages, such as French and Italian, and the Germanic languages, such as German, Dutch, Swedish and so on. English does not pattern with the other Germanic languages in this respect; in English, main verbs do not move to a higher position in the phrase structure tree, with the exception of two main verbs, *have* and *be*, and the auxiliary verbs. The verb movement parameters provide the child with the option: my language does or does not allow verb movement. Children acquiring verb movement languages quickly set the verb movement parameters to the 'does allow' value. English-speaking children never make the mistake of moving the verb – even when they do not yet have auxiliaries. In both cases, the children have set the parameter to the correct value for their language. Even after English-speaking children acquire the auxiliaries and figure out the movement rule for questions, they never overgeneralise this movement to include main verbs (other than *have* and *be*). This parameter, too, appears to be set early in development. Children simply have to decide whether verb movement is possible in their language or not.

The innateness hypothesis provides an answer to *the logical problem of language acquisition* posed by Chomsky: What accounts for the ease, rapidity and uniformity of language acquisition in the face of impoverished data? The answer is that children acquire a complex grammar quickly and easily without any particular help beyond exposure to the language because they do not start from scratch. Because children construct their grammar according to an innate blueprint, they all proceed through similar developmental stages.

Research continues to investigate exactly what universal principles are part of UG, and the nature of its parameters. The properties of UG mean that the human brain is specially equipped to acquire a range of typologically diverse human language grammars.

Acquiring linguistic knowledge

In the previous section we reviewed two approaches to language acquisition, the usage-based approach and the theory of UG, both of which contribute to an ongoing debate about the nature of the language faculty.

As we have noted, usage-based researchers working in the constructivist framework argue that children have to learn all of their linguistic knowledge by paying attention to the input, and attempting to replicate the form and function of what they hear. Usage-based researchers argue that children have to learn the different syntactic categories over time, and deny that children have any innate linguistic knowledge. Researchers working in the framework of UG, by contrast, argue that humans are born with innate linguistic knowledge that guides children in their acquisition of language. The principles and parameters of UG interact with data from the local language as the child learns the lexicon and language-specific rules of their local language. Children have an inbuilt system of principles or constraints and parameters; they use syntactic categories such as NP and VP and use them to form phrase structure rules for building phrase structures and for carrying out transformations. Sentences such as *Nobody don't like me* and *Want other one spoon, Daddy* may contain errors from the perspective of the adult grammar. A usage-based acquisition researcher might argue that the child has misanalysed the input data in some way. A researcher working in the UG framework would likely argue that such 'errors' are a window into how the linguistic knowledge provided by UG develops into the target grammar.

Naturally, children do not one day wake up with a fully formed mental grammar of the language spoken in their environment. Relative to the complexity of the adult grammar that they eventually attain, the process of language acquisition is fast, but it is not instantaneous. From first words to virtual adult competence takes three to four years, during which time children pass through linguistic stages. Children's early utterances may not look exactly like adult sentences, but the words and sentences that children produce at each stage of development conform to the grammar that they have developed to that point.

We will begin by reviewing the perception and production of speech sounds in infants. How do children respond to speech in the first few months? Do they babble using the sounds of their native language? How do they break into learning language, and segment the speech stream? Following this, we will discuss the stages children pass through as they acquire the phonology, the lexicon, morphology, syntax, semantics and pragmatics of their language.

Infant perception and production of speech sounds

> An infant crying in the night:
> An infant crying for the light:
> And with no language but a cry.
>
> Lord Alfred Tennyson, *In Memoriam A.H.H.*, 1849

The notion that a person is born with a mind like a blank slate is belied by a wealth of evidence that newborns are reactive to some subtle distinctions in their environment but not to others. That is, the mind appears to be attuned at birth to receive certain kinds of information. Infants will respond to visual depth and distance distinctions, to differences between rigid and flexible physical properties of objects, and to human faces rather than to other visual stimuli.

Infants also show a very early response to different properties of language. One experimental technique that is used for infants measures sucking rate. Experiments demonstrate that infants will increase their sucking rate – measured by ingeniously designed dummies – when stimuli (visual or auditory) presented to them are varied but will decrease the sucking rate when the same stimuli are presented repeatedly. Another technique used to test very young children is the preferential listening technique. This technique measures children's gaze time in response to auditory stimuli that are played through two different speakers, positioned on either side of the child. When the stimuli are played, the child is expected to turn their head and look at a flashing light that is next to the speaker. When tested with this preferential listening technique, infants will turn their heads towards and listen longer to sounds, stress patterns and words that are familiar to them. These instinctive responses can be used to measure a baby's ability to discriminate and recognise different linguistic stimuli.

Similarly, newborns respond to phonetic contrasts found in human languages even when these differences are not phonemic in the language spoken in the baby's home. An English baby hearing a human voice over a loudspeaker saying [pɐː] [pɐː] [pɐː] will slowly decrease her rate of sucking. If the sound changes to [bɐː] or even [pʰɐː], the sucking rate increases dramatically. Controlled experiments show that adults find it difficult to differentiate between the allophones of one phoneme, but for infants it comes naturally. Japanese infants can distinguish between [ɹ] and [l] while their parents cannot; babies can hear the difference between aspirated and unaspirated stops even if students in an introductory linguistics course find it a challenge. Babies can discriminate between sounds that are phonemic in other languages and non-existent in the language of their parents. In Hindi, for example, there is a phonemic contrast between a retroflex [ʈ] and the alveolar [t]. To English-speaking adults, these sound the same; to their infants, they do not.

Infants can perceive voicing contrasts, such as [pɐː] versus [bɐː]; contrasts in place of articulation, such as [da] versus [ga]; and contrasts in manner of articulation, such as [ɹɐː] versus [lɐː] or [ɹɐː] versus [wɐː], among many others. Babies will not react to distinctions that never correspond to phonemic contrasts in any human language, such as sounds spoken more or less loudly or sounds that lie between two phonemes. Furthermore, a vowel that we perceive as [iː], for example, is a different physical sound when produced by a male, a female or a child, but babies ignore the non-linguistic aspects of the speech signal just as adults do.

Infants appear to be born with the ability to perceive just those sounds that are phonemic in some language. It is therefore possible for children to learn any human language they are exposed to. During the first years of life, the infant's job is to uncover the sounds of the ambient language. From around six months, an infant begins to lose the ability to discriminate between sounds that are not phonemic in his or her own language. The linguistic environment moulds the infant's initial perceptions. Japanese infants can no longer hear the difference between [ɹ] and [l], which do not contrast in Japanese, whereas babies in English-speaking homes retain this perception. They have begun to acquire the sounds of the language of their parents. Before that, they appear to know the sounds of human language in general.

Babbling

babbling

Sounds produced in the first few months after birth that gradually come to include only sounds that occur in the language of the household. Deaf children babble with hand gestures.

Just as the linguistic environment shapes perception, it also shapes the speech the infant is producing. At around six months, infants begin to babble. The sounds produced in this period include many that do not occur in the language of the environment. However, **babbling** is not linguistic chaos. The 12 most frequent consonants in the world's languages make up 95 per cent of the consonants infants use in their babbling. There are linguistic constraints even during this very early stage. The early babbles consist mainly of repeated consonant–vowel sequences, such as *mama*, *gaga* and *dada*. Later babbles are more varied.

By the end of the first year, the child's babbles come to include only those sounds and sound combinations that occur in the target language. Babbles begin to sound like words, though they may not have any specific meaning attached to them. At this point adults can distinguish the babbles of an English-babbling infant from those of an infant babbling in Cantonese or Arabic. During the first year of life the infant's perceptions and productions are being fine-tuned to the surrounding language.

Deaf infants produce babbling sounds that are different from those of hearing children. Babbling is related to auditory input and is linguistic in nature. Studies of vocal babbling of hearing children and manual babbling of deaf children support the view that babbling is a linguistic ability related to the kind of language input the child receives. These studies show that four- to seven-month-old hearing infants exposed to spoken language produce a restricted set of phonetic forms. At the same age, deaf children exposed to sign language produce a restricted set of signs. In each case the forms are drawn from the set of possible sounds or possible gestures found in spoken and signed languages.

Babbling illustrates the readiness of the human mind to respond to linguistic cues from a very early stage. During the babbling stage, the intonation contours produced by hearing infants begin to resemble the intonation contours of sentences spoken by adults. The semantically different intonation contours are among the first linguistic contrasts that children perceive and produce. During this same period, the vocalisations produced by deaf babies are random and non-repetitive. Similarly, the manual gestures produced by hearing babies differ greatly from those produced by deaf infants exposed to sign language. The hearing babies move their fingers and clench their fists randomly with little or no repetition of gestures. The deaf infants use more than a dozen different hand motions repetitively, all of which are elements of the sign languages used in the infant's deaf community.

The generally accepted view is that humans are born with a predisposition to discover the units that serve to express linguistic meanings and that at a genetically specified stage in neural development, the infant will begin to produce these units – sounds or gestures – depending on the language input they receive. This suggests that babbling is the earliest stage in language acquisition, in opposition to an earlier view that babbling was pre-linguistic and merely neuromuscular in origin. The 'babbling as language acquisition' hypothesis is supported by recent neurological studies that link babbling to the language centres of the left hemisphere, providing further evidence that the brain specialises for language functions at a very early age. Next, we consider how children learn to break up the speech that they hear into meaningful units.

Segmenting the speech stream

> I scream, you scream, we all scream for ice-cream.
>
> Transcribed from vocals by Tom Stacks, performing with Harry Reser's Six Jumping Jacks, 14 January 1928

Speech is a continuous stream broken only by breath pauses. Children are in the same fix that you might be in if you tuned in to a foreign-language radio station. You would not have any idea what was being said or what the words were. Intonation breaks that do exist do not necessarily correspond to word, phrase or sentence boundaries. The adult speaker with knowledge of the lexicon and grammar of a language imposes structure on the speech he or she hears, but a person without such knowledge cannot. How then do babies, who have not yet learnt the lexicon or rules of grammar, extract the words from the speech they hear around them? The ability to segment the continuous speech stream into discrete units – words – is one of the remarkable feats of language acquisition.

Studies show that infants are remarkably good at extracting information from continuous speech. They seem to know what kind of cues to look for in the input that will help them to isolate words. One of the cues that English-speaking children attend to that helps them figure out word boundaries is stress.

As noted in Chapter 3 every content word in English has a stressed syllable. (Function words, such as *the*, *a*, *am*, *can*, are ordinarily unstressed.) If the content word is monosyllabic, then that syllable is stressed as in *dóg* or *hám*. Bisyllabic content words can be **trochaic**, which means that stress is on the first syllable, as in *páper* and *dóctor*, or **iambic**, which means stress is on the second syllable, as in *giráffe* or *devíce*. The vast majority of English words have trochaic stress. In controlled experiments adult speakers are quicker at recognising words with trochaic stress than words with iambic stress. This can be explained if English-speaking adults follow a strategy of taking a stressed syllable to mark the onset of a new word.

trochaic
Stress on the first **syllable** of a two-syllable word, e.g. *páper*.

iambic
Stress on the second **syllable** of a two-syllable word, e.g. *giráffe.*

But what about children? Could they use the same strategy? Stress is very salient to infants and they are quick to acquire the rhythmic structure of their language. Using the preferential listening technique mentioned earlier, researchers have shown that at just a few months old, infants are able to discriminate native and non-native stress patterns. Before the end of the first year, their babbling takes on the rhythmic pattern of the ambient language. At about nine months old, English-speaking children prefer to listen to bisyllabic words with initial rather than final stress. And most notably, studies show that infants acquiring English can indeed use stress cues to segment words in fluent speech. In a series of experiments, infants who were seven-and-a-half months old listened to passages with repeated instances of a trochaic word, such as *púppy*, and passages with iambic words, such as *guitár*. They were then played lists of words, some of which had occurred in the previous passage and others that had not. Experimenters measured the length of time that they listened to the familiar versus unfamiliar words. The results showed that children listened significantly longer (indicated by turning their head in the direction of the loudspeaker) to words that they had heard in the passage, but only when the words had the trochaic pattern (*púppy*). For words with the iambic pattern (*guitár*), the children responded only to the stressed syllable (*tár*), though the monosyllabic word *tar* had not appeared in the passage. These results suggest that the infants – like adults – are taking the stressed syllable to mark the onset of a new word. Following such a strategy will sometimes lead to errors (for iambic words and unstressed function words), but it provides the child with a way of getting started. This is sometimes referred to as **prosodic bootstrapping**. Infants can use the stress pattern of the language as a start to word learning.

prosodic bootstrapping
The learning of word or phrase segmentation by infants inferred from the stress pattern of a language.

Infants are also sensitive to phonotactic constraints and to the distribution of allophones in the target language. For example, we noted in Chapter 3 that in English aspiration typically occurs at the beginning of a stressed syllable – [pʰɪt] versus [spɪt] – and that certain combinations of sounds are more likely to occur at the end of a word rather than at the beginning, for example [ɪt]. Studies show that nine-month-olds can use this information to help segment speech into words in English.

Languages differ in their stress patterns as well as in their allophonic variation and phonotactics. Would infants then need some way to first figure out what stress pattern they are dealing with or what the allophones and possible sound combinations are before they could use this information to extract the words of their language from fluent speech? This seems to be a classic chicken-and-egg problem – the infant has to know the language to learn the language. A way out of this conundrum is provided by the finding that infants may also rely on statistical properties of the input to segment words, such as the frequency with which particular sequences of sounds occur.

In one study, eight-month-old infants listened to two minutes of speech formed from four nonsense words, *pabiku*, *tutibu*, *golabu*, *babupu*. The words were produced by a speech synthesiser and strung together in three different orders, analogous to three different sentences, without any pauses or other phonetic cues to the word boundaries. Here is an example of what the children heard:

golabupabikututibubabupugolabubabupututibu

After listening to the strings the infants were tested to see if they could distinguish the 'words' of the language, for example *pabiku* (which, recall, they had never heard in isolation before), from sequences of syllables that spanned word boundaries, such as *bubabu* (also in the input). Despite the very brief exposure and the lack of boundary cues, the infants were able to distinguish the words from the non-words. The authors of the study conclude that the children do this by tracking the frequency with which the different sequences of syllables occur: the sequences inside the words (e.g. *pa–bi–ku*) remain the same whatever order the words are presented in, but the sequences of syllables that cross word boundaries will change in the different presentations and hence these sequences will occur much less frequently. Though it is still unclear how much such statistical procedures can accomplish with real language input, which is vastly larger and more varied, this experiment, and others like it, suggest that babies are sensitive to statistical information as well as linguistic structure to extract words from the input. It is possible that they first rely on statistical properties to isolate some words and then, based on these words, they are able to detect the rhythmic, allophonic and phonotactic properties of the language, and with this further knowledge they can do further segmentation. Studies that measure infants' reliance on statistics versus stress for segmenting words support this two-stage model: younger infants (seven-and-a-half months old) respond to frequency while older infants (nine months old) attend to stress, allophonic and phonotactic information.

The acquisition of phonology

Children's first words are generally monosyllabic with a consonant–vowel (CV) structure. The vowel part may be a diphthong, depending on the language being acquired. The child's phonemic or phonetic inventory – at this stage they are equivalent – is much smaller than is found in the adult language. It appears that children first acquire the small set of sounds common to all languages of the world, no matter what language they hear, and in later stages they acquire the less common sounds of their own language. Most languages have, for example, the sounds [p] and [s], but [θ] is a rare sound. An English-speaking child's early phonological inventory is likely to include the consonants [b], [m], [d], and [k], which are frequently occurring sounds in the world's languages.

In general, the order of acquisition of classes of sounds goes by manner of articulation: nasals are acquired first, then glides, stops, liquids, fricatives and affricates. Natural classes characterised by place-of-articulation features also appear in children's utterances according to an ordered series: labials, velars, alveolars and palatals. It is not surprising that *mama* is an early word for many children.

The distribution and frequency of sounds in a language can also influence the acquisition of certain segments. Sounds that are expected to be acquired late may appear earlier in children's language when they are frequently occurring. For example, the fricative [v] is a very late acquisition in English but it is an early phoneme in Estonian, Bulgarian and Swedish, languages that have several [v]-initial words that are common in the vocabularies of young children.

If the first year is devoted to figuring out the phonetic inventory of the target language, the second year involves learning how these sounds are used in the phonology of the language, especially which contrasts are phonemic. When children first begin to contrast one set – that is, when they learn that /p/ and /b/ are distinct phonemes – they also begin to distinguish between /t/ and /d/, /s/ and /z/ and all the other voiceless–voiced phonemic pairs. As we would expect, the generalisations refer to natural classes of speech sounds.

Controlled experiments show that children at this stage can perceive or comprehend many more phonological contrasts than they can produce. The same child who says [wæbət] instead of *rabbit*, and who does not seem to distinguish [w] and [ɹ], will not make mistakes on a picture identification task in which they must point to either a ring or a wing. In addition, children sometimes produce a sound in a way that makes it indiscernible to adult observers. Acoustic analyses of children's utterances show that the child's pronunciations of *wing* and *ring* are physically different sounds, though they may seem the same to the adult ear. As a further example, a spectrographic analysis of *ephant*, 'elephant', produced by a three-year-old child clearly showed an [l] in the representation of the word even though the adult experimenter could not hear it.

Many anecdotal reports also show the disparity between the child's production and perception at this stage. An example is the exchange between linguist Neil Smith and his two-year-old son Amahl. (At this age Amahl's pronunciation of *mouth* is [maʊs] (British English pronunciation).)

NS:	What does [maʊs] mean?
A:	Like a cat.
NS:	Yes, what else?
A:	Nothing else.
NS:	It's part of your head.
A:	[fascinated]
NS:	[touching A's mouth] What's this?
A:	[maʊs]

According to Smith, it took Amahl a few seconds to realise his word for *mouse* and for *mouth* were the same. It is not that Amahl and other children do not hear the correct adult pronunciation. They do, but they are unable in these early years to produce it themselves. Another linguist's child (yes, linguists love to experiment on their own children) pronounced the word *light* as *yight* [jɑet] [jaɪt] but would become very angry if someone said to him, 'Oh, you want me to turn on the yight'. 'No no', he would reply, 'not yight – yight!'

Therefore, even at this stage, it is not possible to determine the extent of the grammar of the child – in this case, the phonology – simply by observing speech production. It is sometimes necessary to use various experimental and instrumental techniques to tap the child's competence.

A child's first words show many substitutions of one feature for another or one phoneme for another. An Australian English-speaking child may pronounce *mouth* as [mæɔs] 'mouse', with the alveolar fricative [s] replacing the less common interdental fricative [θ], or *light* [lɑet] may be pronounced 'yight' [jɑet], with the glide [j] replacing the liquid [l], and *rabbit* may be pronounced 'wabbit', with the glide [w] replacing the liquid [ɹ]. Glides are acquired earlier than liquids and hence substituted for them. These substitutions are simplifications of the adult pronunciation. They make articulation easier until the child achieves greater articulatory control.

Children's early pronunciations are not haphazard, however. The phonological substitutions are rule governed. The following is an abridged lexicon for an American child, Michael, between the ages of 18 and 21 months:

[pun]	spoon	[maɪtl]	Michael
[peɪn]	plane	[tɪs]	kiss
[pati]	Papi	[taʊ]	cow
[mani]	Mummy	[tin]	clean
[bərt]	Bert	[polə]	stroller
[bərt]	(big) Bird		

Michael systematically substituted the alveolar stop [t] for the velar stop [k], as in his words for *cow*, *clean*, *kiss* and his own name. He also replaced labial [p] with [t] when it occurred in the middle of a word, as in his word for *Papi*. He reduced consonant clusters in *spoon*, *plane* and *stroller* and he devoiced final stops as in *Big Bird*. In devoicing the final [d] in *bird*, he created an ambiguous form [bərt] referring to both Bert and Big Bird. These same substitutions might be seen in children acquiring Australian English and New Zealand English as well.

Michael's substitutions are typical of the phonological rules that operate in the very early stages of acquisition. Other common rules are reduplication – *bottle* becomes [baba], *water* becomes [wawa], and the dropping of final consonants – *bed* becomes [be], *cake* becomes [ke]. These two rules show that children prefer a simple CV syllable.

Early phonological rules generally reflect natural phonological processes that also occur in adult languages. Various adult languages have, for example, a rule of syllable-final consonant devoicing (German does, English does not). Children do not create bizarre or whimsical rules. Their rules conform to the possibilities seen across languages.

The acquisition of the lexicon

> Suddenly I felt a misty consciousness as of something forgotten – a thrill of returning thought; and somehow the mystery of language was revealed to me … Everything had a name, and each name gave birth to a new thought.
>
> Helen Keller, *The Story of My Life*, 1903

In this section we discuss the form of children's first words, how children construct word meanings and how they add new words to their lexicon.

Some time after the age of one, the child begins to repeatedly use the same string of sounds to mean the same thing. At this stage children realise that sounds are related to meanings. They have produced their first true words. There is a great deal of individual variation in when children achieve this step. Children who are late talkers often catch up, but some may go on to show a profile of delayed language or specific language impairment (which will be discussed in Chapter 8). The age at which children talk is not related to IQ, however. It is reported that Einstein did not start to speak until he was three or four years old!

Children's first utterances differ from adult language. The following words from American English of one child, JP, at the age of 16 months, illustrate the point:

[ʔaʊ]	not, no, don't	[sː]	aerosol spray
[bʌʔ]/[mʌʔ]	up	[sjuː]	shoe
[da]	dog	[haɪ]	hi
[ɪʔo]/[sɪʔo]	Cheerios	[sɪ]	shirt, sweater
[sa]	sock	[sæː]/[əsæː]	What's that? Hey, look!
[aɪ]/[ʌɪ]	light	[ma]	Mummy
[baʊ]/[daʊ]	down	[dæ]	Daddy

Most children go through a stage in which their utterances consist of only one word. This stage is the **holophrastic** stage (from *holo*, 'complete' or 'undivided', and *phrase*, 'phrase' or 'sentence') because these one-word utterances seem to convey a more complex message. For example, when JP says 'down', he may be making a request to be put down, or he may be commenting on a toy that has fallen down from the shelf. When he says 'sa' he may simply be naming the sock in front of him, or he may be asking for it. This suggests that children have a more complex mental representation than their language at this point enables them to express. We will see later that the term *holophrase* is also used to refer to an utterance that children treat as one word, even though for adults it has a more complex structure (e.g. *whassat?*).

holophrastic
The stage of child language acquisition in which one word conveys a complex message similar to that of a phrase or sentence.

It has been claimed that deaf babies develop their first signs earlier than hearing children speak their first words. This has led to the development of Baby Sign, a technique in which hearing parents learn and model for their babies' various 'signs', such as signs for *milk*, *hurt* and *mother*. The idea is that the baby can communicate his or her needs manually even before being able to articulate spoken words. Promoters of Baby Sign (and many parents) say that this leads to less frustration and less crying. The claim that signs appear earlier than words is controversial, however. Some linguists argue that what occurs earlier in both deaf and hearing babies are pre-linguistic gestures that lack the systematic meaning of true signs. Baby Sign may be exploiting this earlier manual dexterity and not be a precocious linguistic development. More research is needed to investigate this issue.

Children's early vocabulary provides insight into how they use words and construct word meaning. As we saw, children go through a holophrastic stage in which they produce one-word utterances. For JP, the word *up* was originally used only to mean 'Get me up!' when he was either on the floor or in his high chair, but later he used it to mean 'Get up!' to his mother as well. JP used his word for *sock* not only for socks but also for other undergarments that are put on over the feet, such as underpants. This illustrates how a child may extend the meaning of a word from a particular referent to encompass a larger class.

When JP began to use words, the stimulus had to be visible, but that requirement did not last very long. He first used *dog* only when pointing to a real dog, but later he used the word for pictures of dogs in various books. A new word that entered JP's vocabulary at 17 months was *uh-oh*, which he would say after he had had an accident, such as spilling juice or when he deliberately poured his yoghurt over the side of his highchair. His use of this word shows his developing use of language for social purposes. At this time he added two new words meaning 'no', [do:] and [no], which he used when anyone attempted to take something from him that he wanted, or tried to make him do something he did not want to do. He used them either with the imperative meaning of 'Don't do that' or with the assertive meaning of 'I don't want to do that'. Even at this early stage, JP was using words to convey a variety of ideas and feelings, as well as his social awareness.

But how do children learn the meanings of words? Most people do not see this aspect of acquisition as posing a great problem. The intuitive view is that children look at an object, the parent says a word and the child connects the sounds with the object. However, this is not as easy as it seems:

> A child who observes a cat sitting on a mat also observes … a mat supporting a cat, a mat under a cat, a floor supporting a mat and a cat, and so on. If the adult now says 'The cat is on the mat' even while pointing to the cat on the mat, how is the child to choose among these interpretations of the situation?[3]

Even if the parent simply says *cat* and the child by accident associates the word with the animal on the mat, the child may interpret *cat* as 'Cat', the name of a particular animal or of an entire species. In other words, to learn a word for a class of objects, such as 'cat' or 'dog', children have to figure out exactly what the word refers to. On hearing the word *dog* in the presence of a dog, how does the child know that *dog* can refer to any four-legged, hairy, barking creature? Should it include poodles, tiny Maltese terriers, bulldogs and Great Danes, all of which look rather different from one another? What about cows, lambs and other four-legged mammals? Why are they not 'dogs'? The important and very difficult question is: What are the relevant features that define the class of objects we call 'dog' and how does a child acquire knowledge of them? Even if a child succeeds in associating a word with an object, nobody provides explicit information about how to extend the use of that word to other objects to which that word refers.

It is not surprising, therefore, that children often overextend a word's meaning, as JP did with the word *sock*. A child may learn the word *papa* or *daddy*, which she first uses only for her own father, and then extend its meaning to apply to all men, just as she may use the word *dog* to mean any four-legged creature. After the child has acquired his or her first 75–100 words, the overextended meanings start to narrow until they correspond to those of the other speakers of the language. How this occurs is still not entirely understood.

The mystery surrounding the acquisition of word meanings has intrigued philosophers and psychologists as well as linguists. Researchers have shown that children view the world in a similar fashion and apply the same general principles to help them determine a word's meaning. Overextensions are usually based on physical attributes, such as size, shape and texture. *Ball* may refer to all round things, *bunny* to all furry things and so on. However, children will not make overextensions based on colour. In experiments, children will group objects by shape and give them a name, but they will not assign a name to a group of red objects, for example.

One of the principles that has been proposed to facilitate word learning is called the 'whole object principle'. The idea is that if an experimenter points to an object and uses a nonsense word, such as *blick*, to a child, saying 'That's a blick', this will guide the child to interpret the word to refer to the whole object, not one of its parts or attributes. Given the poverty of stimulus for word learning, principles such as the 'form over colour principle' and the 'whole object principle' help the child organise experience in ways that assist word learning. Without such principles, it is doubtful that children could learn words as quickly as they do. Children learn approximately 14 words a day for the first six years of their lives. That averages out to about 5000 words per year. How many foreign-language students know 10 000 words of a language after two years of study?

There is also experimental evidence that children can learn the meaning of one class of words – verbs – based on the syntactic environment in which they occur. If you were to hear a sentence such as *John blipped Mary the gloon*, you would not know exactly what John did, but you would likely understand that the sentence is describing a transfer of something from John to Mary. Similarly, if you heard *John gonked that Mary ...*, you would conclude that the verb *gonk* was a verb of communication like *say* or a mental verb like *think*. The complement types that a verb selects can provide clues to its meaning and thereby help the child. This learning of word meaning based on syntax is referred to as **syntactic bootstrapping**.

syntactic bootstrapping
The learning of word meaning by understanding how the word works in the syntactic structure.

One issue that has been debated is whether principles such as the 'whole object principle' are part of our innate linguistic knowledge, or whether they stem from more general cognitive principles. A usage-based theory of language acquisition like the constructivist theory is likely to assume that cognitive principles are responsible. Researchers assuming the theory of UG have not taken a strong stand on this issue. There is a clear difference in how the two theories of acquisition view syntactic bootstrapping, however. Notice that you could only take advantage of a sentence like *John blipped Mary the gloon* to learn that the verb *blip* involves transfer if you knew the syntactic category of the various words and could put them together to form a representation of the sentence. According to the UG theory of language acquisition, children have innate knowledge of syntactic categories and can form hierarchical sentence representations early in the course of acquisition, so it is likely that children could use syntactic bootstrapping to help facilitate word learning at a young age. On the constructivist theory children do not have early knowledge of syntactic categories, so, even if they could use syntactic bootstrapping as a way to learn word meanings, this method would not be useful until much later in their language development.

The acquisition of morphology

Languages differ in the complexity of their morphological system. English is sometimes termed a morphologically impoverished language because it has few inflectional morphemes (see Chapter 4 for a list). Although the morphological system is simple compared with many other languages, children acquiring English nevertheless take some time before they use the inflectional morphemes consistently. Of course, children first have to learn the meaning of the different morphemes. But even once they have the different morphemes as part of their grammar, the morphemes are still sometimes omitted from children's productions. Researchers have observed that the morphemes that express tense are particularly prone to omission. That is, the present tense –*s* (which also expresses third person), the past tense –*ed*, and auxiliary verbs (*is*, *was*, *do* etc.) are frequently omitted from children's productions. For some children, the tense-related morphemes are not used consistently until about age three. Here are some examples from a child named Lara who is exactly two years old that show typical utterances with omission of morphemes that express tense:

He just stay there

Mummy throw ball

Emily crying

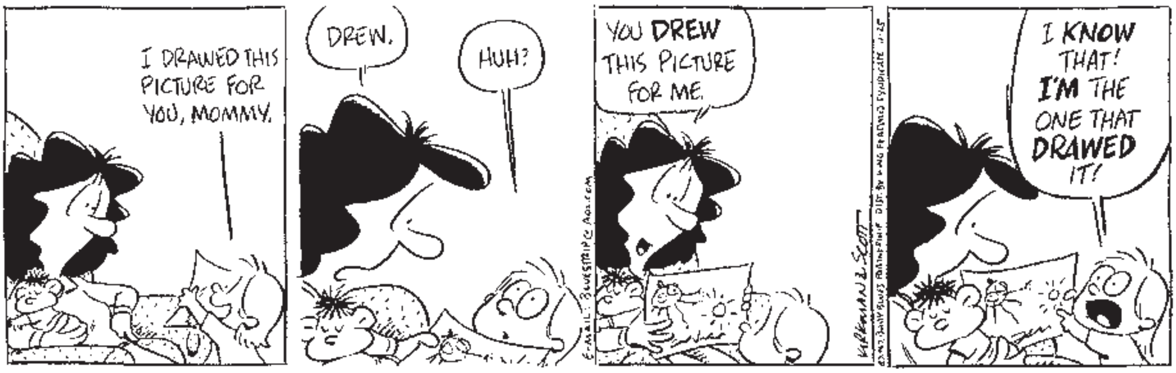
[he] no like you

That mummy's

overgeneralisation
Children's treatment of irregular verbs and nouns as if they were regular, e.g. *bringed*. This shows that the regular rules have been acquired, but not the exceptions.

Children's acquisition of morphology has received a lot of attention partly because it provides clear evidence of rule learning. Children's errors in morphology can reveal their acquisition of the regular rules of the grammar and subsequent overgeneralisation. This **overgeneralisation** manifests itself when children treat irregular verbs and nouns as if they were regular. We have probably all heard children say 'bringed', 'goed', 'drawed' and 'runned', or 'foots', 'mouses', 'sheeps' and 'childs'. The cartoon in **Figure 7.1** highlights the fact that children often overgeneralise, and that they are not usually open to correction for their overgeneralisations.

Figure 7.1 **Overgeneralisation in children**



These mistakes tell us more about how children learn language than the correct forms they use. Children cannot be imitating their parents, as adults do not use these forms. Traditional reports have suggested that children go through three phases in the acquisition of an irregular form, as shown in the following:

Phase 1	Phase 2	Phase 3
Brought	bringed; brought	brought
Broke	breaked; broke	broke

In Phase 1 children use the correct term, such as *brought* or *broke*, which they have learnt from the input. At this point the child's grammar does not necessarily relate the form *brought* to the stem form *bring* or the form *broke* to *break*. At Phase 2, children construct a rule for forming the past tense and start to attach the regular past-tense morpheme to all the verbs they have acquired – *play*, *hug*, *help*, as well as *break* and *bring*. At Phase 2, children may use the rule-based form for irregular verbs most of the time, but they may also sometimes use the (correct) irregular form they first used in Phase 1. During Phase 3 children learn that there are exceptions to the regular rule and once again use *brought* and *broke*. The difference is that at Phase 3, children know that these irregular forms are related to the stem forms.

Steven Pinker and colleagues pointed out that there is a problem with the traditional account. How do children eliminate the incorrect Phase 2 forms, such as *breaked* or *bringed*, from the grammar if there is no systematic overt correction available? An investigation of a large corpus of children's spontaneous speech revealed that children's overgeneralisation errors are not nearly as frequent as researchers had thought and that there is no period when children produce forms like *breaked* or *bringed* the majority of the time. According to Pinker and colleagues, regular verbs form their past tense by the 'add *-ed*' rule, and irregular past tense forms of verbs must be stored in the lexicon as a whole. Once the irregular form is stored in the lexicon, overgeneralisations like *breaked* or *bringed* are blocked, and should occur only on occasions when children have difficulty with lexical retrieval, perhaps because the word is quite new to them, or for performance reasons, such as fatigue. In that case, if children are not able to retrieve the correct irregular form that is stored in their mental lexicon, the past-tense rule kicks in, and then children may produce *breaked* or *bringed*. The child does not have the rule-based forms (*breaked* or *bringed*) entered into their mental lexicon as traditional accounts claimed, so on this account, there is no problem about how the child eliminates the non-adult forms.

Children form morphological rules quite early on in their development of language. In a classic study by Jean Berko, preschool children and children in the first three years of primary school were shown drawings of nonsense animals like the bird-like creature in **Figure 7.2**, which was given the nonsense name 'wug'.

Figure 7.2 **A nonsense animal from the Jean Berko study**

The experimenter would then say to the child, pointing to a particular picture, 'This is a wug'. Then the experimenter would show the child a picture of two of the animals and say, 'Now here is another one. There are two of them. There are two______?' The child's task was to give the plural form, *wugs* /wɐgz/ /wʌgz/. Another little make-believe animal was called a *bik* and when children were shown two *biks*, they were again expected to say the plural form /bɪks/. The children applied the regular plural formation rule to words they had never heard. Their ability to add /z/ when the animal's name ended with a voiced sound, and /s/ when there was a final voiceless consonant, showed that the children were using rules based on an understanding of natural classes of phonological segments, and not simply imitating words they had previously heard. This study was used to argue against the idea that children learn by imitation and for the idea that children have a natural ability to find the rules of language.

Studies of children acquiring languages with more inflectional morphology than English have revealed that they learn tense, agreement and case morphology at a very early age. Italian verbs, for example, must be inflected for number and person to agree with the subject. This is similar to the English agreement rule 'add *s* to the verb' for third-person singular subjects – *He giggles a lot* but *We giggle a lot* – except that in Italian there are more verb forms that must be acquired.

Italian-speaking children between the ages of 1;10 (one year, ten months) and 2;4 correctly inflect the verb, as the following utterances of Italian children show:

Tu legg**i** il libro	You (2nd-person singular) read the book.
Io vad**o** fuori	I go (1st-p. sg.) outside.
Dorm**e** miao dorme	Sleeps (3rd-p. sg.) cat sleeps
Legg**iamo** il libro	(We) read (1st-p. plural) the book.

As we noted, children acquiring English often omit inflectional morphology, but this does not happen with children acquiring more richly inflected languages, such as Spanish and Italian. One proposal suggests that this is partly due to differences in the morphological system. If the third-person present-tense -*s* is omitted in English and you say *He giggle a lot*, you use the stem form of the verb, which is still a pronounceable word. If you left off the inflectional morphology in Italian or many other languages, you would not necessarily be left with a word that can be pronounced in isolation.

Most of the languages whose morphology we have considered so far are familiar Indo-European Romance (e.g. French, Italian) or Germanic languages (e.g. English, German, Swedish). We tend to think of these languages as having separate words that contain one or more morphemes. Not all languages are like this. In fact, we can think of a scale, with some languages having just one or two morphemes per word and others having many morphemes per word. Many of the Australian Aboriginal languages are at the other end of the scale from English. They have a very high morpheme-to-word ratio and are known as **polysynthetic languages**. In many polysynthetic languages, the subject, object and indirect object (if there is one) are all part of a complex word that contains the verb as well sometimes called a 'verbal word'.

polysynthetic language
Allows an inflected verb to function as an independent clause; typically encodes information about the subject, object, indirect object etc. on the verb to create a complex verbal word.

So, how do children learn languages with this kind of morphology? There are some reports about children learning Murrinhpatha, a polysynthetic language spoken in the Daly River region of the Northern Territory of Australia.[4] This language has about 2500 to 3000 speakers, and in general, children do not learn English until they go to school. From the English speaker's perspective, this language looks very challenging to acquire; not only is it polysynthetic, but there are two parts to the verb that sit in different positions in the verbal word. At the beginning of the verbal word is what is known as the **classifier verb stem**. This categorises the event into types having to do with motion, manipulation, posture and so on. The classifier verb stem is not a fixed form but varies according to person number or tense, for example. Morphemes to do with the subject, object, indirect object, and others come next in the verbal word, and later comes the second part of the verb, the **lexical verb stem** that gives a more specific verb meaning.[5]

classifier verb stem
In some polysynthetic languages, including the Daly languages, the verb is formed by two separate parts; the classifier stem categorises the event.

lexical verb stem
The lexical verb stem is the part of the two-part verb that carries the primary meaning.

Data from 2- to 4-year-old children suggest that at first children stick to particular combinations of classifier verb stem and lexical verb stem that they might have heard used by caregivers. As they get older, they understand that different combinations of classifier verb stem and lexical verb stem can be put together to create new verbal meanings. Here is an example of a verbal word used by a child named Emily from a corpus collected by researchers:

na -nga -dharl-nu
2SG.SUBJ.SNATCH(9).FUT-1SG.IO-open-FUT
'You will open it for me.'
LAMP_20130502_WF_01_V100:21:05

Notice that Emily's utterance is one verbal word, but when translated into English, it is translated as six separate words. The gloss shows that the form of the classifier stem *na-* is for a second person singular (*you*) subject. This stem is a **portmanteau morph** that also has a rather general meaning, which is here glossed as *snatch*; *snatch* is number 9 of 38 different classifier stems in Murrinhpatha. The lexical stem is *-dharl* and glossed here as *open*. Notice that Emily uses an indirect object marker marked for first person singular *-nga-* (*for me*), which separates the classifier stem *na-* from the lexical stem *-dharl*. This shows that Emily has understood that the verb is separated into two parts.

portmanteau morph
A portmanteau morph is a morpheme that is created by the fusion of two separate morphemes.

As with other languages, children learning Murrinhpatha initially sometimes omit morphemes; for example, sometimes children omit the classifier stem or substitute some kind of filler syllable while leaving the lexical stem intact. In the following example, we can see from the target line of text that Acacia has dropped the classifier stem *ba-*, which is glossed here *bash* and pronounces the verbal word from the stressed syllable, which is preceded with an apostrophe mark'.

Acacia (2 years 11 months)		
	lalenu	Mavis
Target:	ba-'lele-nu	Mavis
	3SG.SUBJ.BASH(14).FUT-bite-FUT	woman's name
	'It will bite Mavis.'	
		LAMP_20120830_WF_01_V1 00:06:48

So far we have discussed children's acquisition of inflectional morphology. Children also show knowledge of the derivational rules of their language and use these rules to create novel words. In English, for example, we can derive verbs from nouns. From the noun *microwave* we now have the verb *microwave*; from the noun *e(lectronic) mail* we have derived the verb *email*. Children acquire this derivational rule early and use it often since there are many gaps in their verb vocabulary.

Child utterance	Adult translation
You have to scale it.	You have to weigh it.
I broomed it up.	I swept it up.
He's keying the door.	He's opening the door (with a key).

These novel forms support proposals that language acquisition is a creative process and that children's utterances reflect their internal grammars, which include both derivational and inflectional rules.

The acquisition of syntax

The acquisition of syntax is the aspect of child language development where differences between language acquisition theories have been most controversial. As noted at the beginning of the chapter, usage-based theories of language acquisition argue that children do not have any innate linguistic knowledge but rather that children learn all of their linguistic knowledge from the environment. According to constructivist researchers, language acquisition is driven by social cognition, not innate knowledge of linguistic properties. It is thought that the ability and desire to read and share the intentions of other people is what encourages children to engage with language. Once children are interacting with their parents and caretakers, language development proceeds. Children have to listen very carefully to their language input, and the task is to try to imitate and replicate what they hear. Researchers working within the theory of UG, on the other hand, argue that innate knowledge of syntactic categories, principles and parameters is what drives children's acquisition of any native language. While children need to pay attention to the input to learn the vocabulary and other properties of their language, UG plays an important role. We will compare how these two different theories view the stages of language development that children pass through. Before we turn to the theories, there are a couple of background points to cover on 'ages and stages' and methods for studying child language.

mean length of utterance (MLU)
The average number of words or morphemes in a child's utterance.

At the early stages of language acquisition, there is a great deal of individual variation among children. Roger Brown, a famous developmental psychologist at Harvard, pointed out that chronological age is not a good measure of a child's language development and developed **mean length of utterance (MLU)** as an alternative measure of a child's progress. MLU is the average length of the utterances the child is producing at a particular point. MLU can be measured in terms of morphemes, so words like *boys*, *danced* and *crying* each have a value of two (morphemes). MLU can also be measured in terms of words, which is a more revealing measure when comparing children acquiring different languages. MLU was used to define stages of development: stage 1 was MLUs up to 2 and covered the period roughly between 12 and 28 months; stage 2 was MLUs between 2 and 2.5, covering the span of ages between 27 to 30 months; stage 3 was MLUs between 2.5 and 3.0, between 31 and 34 months and so on. For our purposes, however, it is sufficient to give ages.

The earliest studies of child language acquisition were based on diaries kept by parents. Later researchers used audio or video recordings of children's spontaneous speech as the basis for their investigations of child language. This method is still widely used today, especially for longitudinal studies of children's language development. There are now many experimental techniques available for studying child language. Experimental techniques are important because they can answer many questions that cannot be answered by investigating children's spontaneous speech. For example, a technique known as the preferential looking paradigm probes children's comprehension of language before they are actually producing sentences. This technique monitors whether children look more at a video that matches a sentence that they are hearing than one that does not match. If children look significantly more often at the matching picture, researchers would take this to support the proposal that children understood the linguistic structure being tested. Experimental techniques are also important for investigating sentence structures that do not occur much in children's spontaneous speech. In this case, researchers can set up a context in which a particular structure is appropriate for adults, and see what children produce in that context. This technique is known as 'elicited production'. There are also comprehension techniques that can probe the meanings children do and do not allow for sentences. Comprehension techniques often ask children for a judgement about whether a sentence is true in a particular context; this is known as a 'truth-value judgement task'. For example, children might hear a sentence and have to match it to one of two pictures. In another version of the truth-value judgement task an experimenter acts out a story with toys and props, and the child watches alongside a puppet. The story that is acted out represents the sentence meaning. At the end of the story, the puppet (who often does not pay attention) tries to say what happened – this is the target sentence. The child's task is to tell the puppet if it described the story correctly or not. The child's judgement of the puppet's description tells the experimenters how the child understood the sentence.

Early acquisition

Children's first words can be simple words that refer to people and objects in their environment, or they can have broader meanings. Children also acquire what are known as 'holophrases'. These are routines and unanalysed utterances that could potentially be multi-word utterances for an adult. Holophrases might include routines like *bye* or phrases like *here you go* or *whassat?* For the child, *whassat?* is simply a phrase uttered when you want to know what something is, but it is not a question made up of the question word *what* combined with the auxiliary verb *is* positioned in the correct order for a question and in turn followed by *that*. Some evidence for this is that these holophrases have an intonation contour that is appropriate for a whole utterance, not for individual words. It is likely that both theories of language acquisition would agree that holophrases do not have internal structure for children at this stage of development.

Any time from about 18 months of age to their second birthday, children begin to put words together. The following utterances illustrate the kinds of patterns that are found in children's utterances at this stage:

allgone sock
allgone sticky
byebye boat
dirty sock
hi Mummy
it ball
more wet
Katherine sock

These early utterances can express a variety of syntactic and semantic relations. Noun + noun sentences, such as *Mummy sock,* can express a subject + object relation in the situation when the mother is putting the sock on the child, or a possessive relation when the child is pointing to Mummy's sock. Two nouns can also be used to show a subject–locative relation, as in *sweater chair* to mean 'The sweater is on the chair', or to show attribution, as in *dirty sock*. Often children have a variety of modifiers, such as *allgone*, *more,* which they combine with another word. These are known as pivot structures. The pivot word expresses the function of the sentence and is combined with some other element. These productions are clearly not adult-like and it is difficult to know what their internal structure is. In general, however, researchers working within the UG framework would argue that even if children's productions are missing words or morphemes, they are still based on hierarchical structure. The next stage is for children to expand their multi-word utterances. Some examples of children's productions at this stage are:

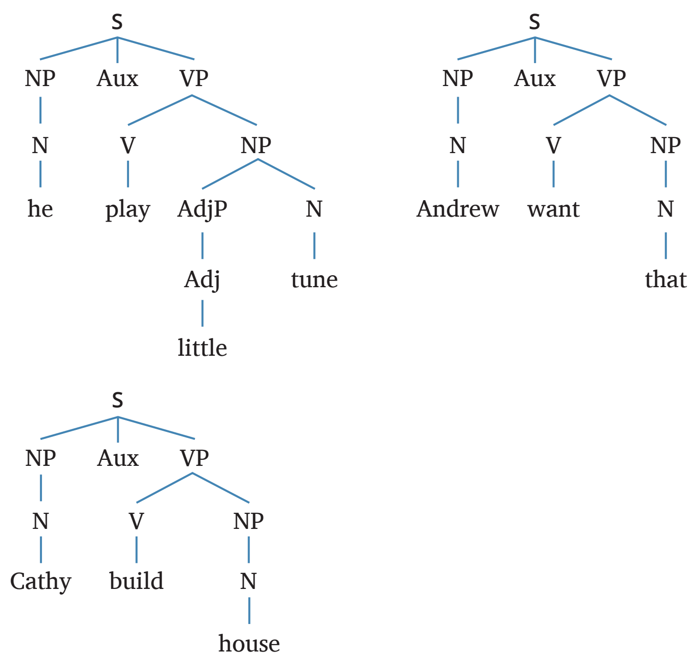
Cat stand up table.
What that?
He play little tune.
Andrew want that.
Cathy build house.
No sit there.

During this stage children often sound as if they are sending an SMS or a Twitter message, or reading an old-fashioned telegram (containing only the required words for basic understanding), which is why such utterances are sometimes called **telegraphic speech**.

telegraphic speech
Children's utterances that may omit **grammatical morphemes** and/or **function words**.

Researchers who work within the constructivist framework propose that exposure to language leads children, over time, to build up lists of utterances they have heard frequently. After frequent exposure to particular constructions, by analogy, children are able to see a pattern in the lists and form what are known as 'item-based constructions'. These are sentence templates containing mostly lexical items (i.e. words) but with a 'slot' in which various words can be substituted; for example, a very simple item-based construction might be 'I want X' where X is the slot where various words can appear (*I want juice*, *I want more apple*, *I want big toast* etc.). At this point, the child does not know what syntactic categories can fill the slot. All they know is that you can say 'I want' and put something after it. Over time, children's item-based constructions become more abstract, in the sense that they have more slots in which different lexical items can be substituted. The 'I want X' item-based construction might become 'X want X', as the child realises that a variety of entities could be 'wanters'. Eventually, in adult grammars, these templates become constructions containing syntactic categories rather than lexical items. For example, in the adult grammar, the 'X want X' construction might be represented as NP V NP. It takes children some time to learn that the slots can be replaced by syntactic categories like NP, VP and so on. It is important to remember, however, that the adult representation (NP V NP) is not shorthand for a hierarchical structure. On this usage-based account, the constructions that children and adults learn are linear representations. In the NP V NP case we have discussed, the construction is the transitive construction in which a NP is followed by a verb, which in turn is followed by another NP, in that order.

According to the theory of UG, children always use hierarchical phrase structure to represent their productions. For children, an utterance like 'I want juice' or 'Cathy build house' necessarily involves the phrase structure rules that form a hierarchical structure. The actual sentence could, nevertheless, be missing the subject NP, or the auxiliary verb and so on. Notice that the phrase trees in the following examples of child sentences use the adult rule for S, so it contains an Aux, but there is no specification for tense in the Aux.



The verb system of English is quite complex because English does not treat auxiliary verbs and main verbs in a uniform way. For example, in questions, auxiliary verbs appear before the subject NP, as in the first example that follows, but main verbs like *eat* do not. If the question contains a main verb, then *do* has to be added as the auxiliary verb.

Is John eating a banana?

*Eats John bananas?

Does John eat bananas?

This difference in the treatment of main verbs and auxiliary verbs presents a challenge for children acquiring English and delays acquisition of syntactic structures that depend on the presence of an auxiliary, the most central of which are questions and negative sentences. Although two-year-old children do not have productive control of auxiliaries, they are still able to form questions. During the telegraphic stage children typically produce questions of the following sort:

Yes–no questions	*Wh*–questions
I ride train?	What cowboy doing?
Mummy egg?	Where milk go?
Have some?	Where kitty?

These utterances have an intonation pattern typical of questions in English, but they do not contain an auxiliary verb. The *wh*-phrase is correctly positioned, however.

The lack of auxiliaries, especially the auxiliary verb *do*, during early acquisition affects the formation of negative sentences. English-speaking children produce negative sentences using *no* or *not* before they have acquired a full range of negative auxiliary verbs like *don't*, *can't*, *won't*, *doesn't* and so on:

He no bite you.

Wayne not eating it.

Kathryn not go over there.

You no bring choo-choo train.

That no fish school.

Making a sentence negative is different from replying negatively to a question or responding negatively to a command. Children at this stage understand the pragmatic force of negation, and have no difficulty responding 'No!' when asked to take a nap.

Researchers have debated why children omit grammatical morphemes. One possibility is that this happens for performance reasons. The idea would be that due to limited processing capacity or limited working memory, there is an upper limit on the length of utterance children can produce. Given this limitation, function morphemes, which are prosodically and semantically weak, end up being omitted in production. Alternatively, it could be something about the grammar itself at this point that causes the omissions. One proposal is that children's grammars have to undergo some kind of linguistic maturation, and until this maturation takes place, grammatical morphemes, especially ones that express tense, are optionally omitted.

Later acquisition

Between the ages of 2;6 (two years and six months) and 3;6, children's language develops very quickly. As noted, by the age of 3;0 most children are consistent in their use of inflectional morphemes, including tense-related morphemes. Children have acquired the auxiliary verb system, which means that their questions and negative sentences become more adult-like. They also start to produce more complex structures, including coordinated sentences and sentences with an **embedded clause**.

embedded clause
A clause that is subordinate to the main clause of the sentence.

Once children have acquired the auxiliary verb system, their *wh*-questions and yes–no questions become more adult-like. Children drop the auxiliary verb only occasionally. The following questions are representative of a child at this stage.

Yes–no questions

Does the kitty stand up?

Can I have a piece of paper?

Will you help me?

We can go now?

Wh-questions

Which way they should go?

What can we ride in?

What will we eat?

Notice that in most of the questions, the auxiliary verb precedes the subject NP, but there are also a few questions in which this is not the case, namely, *We can go now?* and *Which way they should go?* It is worth exploring how the two theories of language acquisition explain these adult-like and non-adult questions.

According to the theory of UG, in order to produce adult-like *wh*-questions, children have to acquire the Aux-movement rule (see Chapter 5). The Aux-movement transformation moves the Aux in a declarative sentence to the C position. Once children acquire the transformation, they should produce questions like the adult ones in the list above. Research shows that preschool children successfully carry out the 'move Aux to C' rule over 90 per cent of the time. It is not clear why children sometimes fail to do the Aux to C transformation, but in this case, the Aux will be produced in its unmoved position, which explains non-adult questions like *We can go now?* and *Which way they should go?*

According to constructivist language-acquisition researchers, children learn question structures gradually, by listening to the input. Children do not learn any kind of transformational rule on this view. Rather, children have to learn which *wh*-phrases (i.e. *what*, *who*, *which boy, how* etc.) can combine with which auxiliary verbs. Children simply learn these individual combinations, and there are many of them to learn. The combinations that are frequently used in the input will be acquired first. For example, *what* + *can* is likely to occur frequently in the parental input, so children should learn to ask questions beginning with *what* + *can* before, say, ones beginning with a less frequent combination, such as *which way* + *should*. This would explain why *What can we ride in?* is adult-like, whereas *Which way they should go?* is not. The challenge for the usage-based account is to explain why children produce questions like *Which way they should go?*, given that they do not hear questions like this in their parents' and caretakers' speech. Constructivist researchers have proposed that in this case children do the best they can, and merge together items that they know. They have heard the *wh*-expression *which way*, and they can produce sentences like *They should go*, so they just merge these together to produce *Which way they should go?*

The introduction of auxiliaries into the child's grammar also affects negative sentences. Children can produce negative sentences with negative auxiliary verbs, although the auxiliary verb *be* is sometimes still missing, as in the last example below:

Paul can't have one.

Donna don't like me.

I don't want cover on it.

It's not cold.

I not crying.

Children acquiring English always place the negative item in the correct position in relation to the auxiliary or *be*. Main verbs follow negation and *be* precedes negation. Children have not been observed to produce errors like *Mummy dances not*, although it would be the correct word order for other languages, such as French.

Children also start to produce various kinds of complex sentence structures that involve more than one clause. Some of the earliest sentences with an embedded clause are ones with verbs like *want*, as in *I want to go outside.* The embedded clause is an infinitival clause. Infinitival clauses like *to go outside* do not have any specification for tense. Sentences with an embedded finite clause also emerge. In an example like *I think she's sick*, the embedded clause is *she's sick*. Since there is a verb carrying tense, *is*, the embedded clause is finite. We also see sentences in which two sentences are conjoined with *and*, *but* or *or*. Sentences conjoined with *and*, in particular, are frequent in preschool children's speech. Children also start producing sentences with a range of conjunctions, such as *because* or *since*, but also clauses with temporal conjunctions such as *when* and *while*. Embedded questions like *I know what to do* and *I wonder what he likes* emerge. Finally, children produce relative clauses. Relative clauses always modify a noun in the sentence. Early relative clauses, like the ones in (i) and (j) in the following example, are drawing the speaker's attention to something in the context.

a	I want to go outside.	(embedded infinitival clause)
b	I like to play with something else.	(embedded infinitival clause)
c	I think she's sick.	(embedded sentence)
d	He was stuck and I got him out.	(coordinated sentence)
e	I want this doll because she's big.	(sentence with conjunction)
f	I want to go when Ben can go.	(temporal conjunction)
g	I know what to do.	(embedded question)
h	I wonder what he likes.	(embedded question)
i	Look at the train Ursula bought.	(relative clause)
j	This is the sugar that goes in there.	(relative clause)

There are also some structures of English that do not appear very frequently in children's spontaneous speech, perhaps because they are challenging structures. Children may avoid such structures and find an alternative way to express what they want to say. In this case, experimental tasks, such as elicited production or the truth-value judgement task, are needed to probe children's grammatical knowledge. Examples of structures that are quite infrequent in children's spontaneous production data are passive sentences, certain types of relative clause and complex *wh*-questions. One reason that passive sentences are difficult is because the NPs in the sentence do not carry the usual thematic roles (see Chapter 6). To see this, compare the following declarative sentence (an 'active' sentence) and its passive counterpart. In the active sentence *The cat chases the mouse,* the subject NP, *the cat*, is the agent of the chasing, and therefore bears the agent thematic role. The object NP, *the mouse*, undergoes the chasing and therefore takes the theme thematic role. In the passive sentence, these thematic roles are reversed; the subject NP, *the mouse*, now has the theme role, and the agent thematic role is assigned to *the cat*, which is inside the by-phrase.

The cat chases the mouse
Agent Theme
The mouse was chased by the cat
Theme Agent

The UG theory has proposed that active and passive sentences are related by movement, and that children have difficulty with the transformation (see Chapter 5 for details of the transformation). Constructivist researchers would point to the fact that adults use few passive sentences that include by-phrases in their colloquial speech. On this theory, an infrequent structure will be acquired later than one that is frequent in the input to children.

Children also produce few complex *wh*-questions in their spontaneous speech. Those they do produce are ones like *What do you think is in the box?* These are called **long-distance *wh*-questions** because, on the UG theory, the *wh*-phrase *what* has moved a 'long distance' from the embedded clause to its initial position. It may be that children prefer to ask simple questions like *What's in the box?* and avoid long-distance ones like *What do you think is in the box?* Elicited production experiments show that children can produce long-distance questions when put in a situation where it is necessary to find out what someone thinks. Children do not always ask these questions as adults would, however. Consider the following sentence:

Who do you think who Grover wants to hug?

long-distance *wh*-question
A long-distance *wh*-question is one in which the *wh*-phrase has moved out of the embedded clause to its initial position in the question, e.g. *Who do you think took my iPhone?*

Researchers working in the UG framework have proposed that such questions show that children have innate linguistic knowledge of how *wh*-movement works. It has been proposed that *wh*-phrases always move out of an embedded clause through the intermediate clause as they move to the initial question position. Adults move the *wh*-phrase through the intermediate clause, but they do not pronounce the *wh*-phrase in this position as well as in the initial position. Children, on the other hand, have not learnt this yet, and pronounce the *wh*-phrase in both positions. This is a possible way to ask long-distance questions in certain dialects of German and Dutch, particularly in conversational language. UG researchers have pointed out that this shows that children's errors sometimes indicate properties that are possible in other languages of the world. Constructivist researchers have another explanation for the error. They suggest that in the absence of much linguistic experience, children merge the common phrase *What do you think?* with the simple *wh*-question *What's in the box?*

The acquisition of pragmatics

In addition to acquiring the rules of syntax, children must learn the appropriate use of language in context – pragmatics.

The speaker and the listener form part of the context of an utterance. Context is needed to determine the reference of pronouns and use them appropriately. A sentence such as *Amazingly, he loves her* is difficult to interpret unless both speaker and hearer understand who the pronouns *he* and *her* refer to. If the sentence were preceded by *I saw John and Mary kissing in the park*, then it would be clear to the listener who the pronouns refer to. Children are not always sensitive to the needs of their interlocutors and they may fail to establish the referents for pronouns. Younger children (around age two) have difficulty with the shifting reference of these pronouns. Occasionally children at this age refer to themselves as *you*, saying, for example, *You want to go for a walk* when they mean *I want to go for a walk*. It is not unusual for a three- or four-year-old (or even older children) to use pronouns out of the blue, without establishing their reference first. For example, a child might cry out to his mother *He hit me* when the mother has no idea who did the deed.

Children also show a lack of pragmatic awareness in the way they sometimes use articles. Like pronouns, the interpretation of articles depends on context. The definite article *the* as in *the boy* can be used felicitously only when it is clear to speaker and hearer what boy is being discussed. In a discourse, the indefinite article *a/an* must be used for the first mention of a new referent; the definite article (or pronoun) may be used in subsequent mentions, as illustrated below:

A boy walked into the class.

He was in the wrong room.

The teacher directed the boy to the right classroom.

Children do not always respect the pragmatic rules for articles. In experimental studies, three-year-olds are just as likely to use the definite article as the indefinite article for introducing a new referent. In other words, the child tends to assume that the listener knows who is being talked about without having established this in a linguistically appropriate way.

It may take a child several years to master those aspects of pragmatics that involve establishing the reference for function morphemes, such as determiners and pronouns.

The acquisition of signed languages

Deaf children who are born to deaf signing parents are naturally exposed to sign language just as hearing children are naturally exposed to spoken language. Given the universal aspects of sign and spoken languages, it is not surprising that language development in these deaf children parallels the stages of spoken language acquisition. Deaf children babble first, then they progress to single signs similar to the utterances in the holophrastic stage, and finally they begin to combine signs. There is also a telegraphic stage in which the function signs may be omitted. Use of function signs becomes consistent at around the same age for deaf children as function words in spoken languages. The ages at which signing children go through each of these stages are comparable to the ages of children acquiring a spoken language.

Like the acquisition of spoken languages, the acquisition of signed languages involves the interaction of universal and language-particular components. Assuming the theory of UG, we saw in our discussion of the acquisition of questions in English that children easily acquire *wh*-movement, which is governed by universal principles, but they show some delay in their use of Aux movement. This is because they first must learn the auxiliaries, which are specific to English.

In *wh*-questions in Auslan, the *wh*-sign may be moved to the front of the sentence, as in English, but this is an optional rule (*wh*-signs may also remain in situ). However, there is no Aux movement in Auslan: a question may be accompanied by a facial expression with the brow furrowed and the head tilted forwards. This non-manual marker is part of the grammar of Auslan. Children learning Auslan easily acquire the rules associated with the *wh*-phrase. But the children will sometimes omit the non-manual marker, which is not possible in the adult language. Like the English auxiliaries, the non-manual markers are specific to Auslan and so they take longer to learn.

Sometimes the parallels between the acquisition of signed and spoken languages are surprising. Some of the grammatical morphemes in Auslan are semantically transparent or **iconic**, that is, they look like what they mean. The sign for the pronoun *I*, for example, involves the speaker pointing to the chest. The sign for the pronoun *you* is a point to the chest of the addressee. As we discussed earlier, at around age two children acquiring spoken languages often reverse the pronouns *I* and *you*. Interestingly, at this same age signing children make this same error. They will point to themselves when they mean 'you' and point to the addressee when they mean 'I'. Children acquiring sign languages make this error despite the transparency or iconicity of these particular signs. As part of the language, the shifting reference of these pronouns presents the same problem for signing children that it does for speaking children.

iconic/iconicity
A non-arbitrary relationship between form and meaning in which the form bears a resemblance to its meaning, e.g. the male and female symbols on (some) toilet doors.

Hearing children of deaf parents acquire both sign language and spoken language when exposed to both. Studies show that Canadian bilingual children who acquire both the *Langue des Signes Québécoise* (LSQ, Quebec Sign Language) and French develop the two languages exactly like bilingual children acquiring two spoken languages. The LSQ–French bilinguals reached linguistic milestones in each of their languages in parallel with Canadian children acquiring French and English. They produced their first words, as well as their first word combinations, at the same time in each language. In reaching these milestones neither group showed any delay when compared to monolingual children.

Deaf children of hearing parents who are not exposed to sign language from birth may experience a delay in acquiring language. Yet the instinct to acquire language is so strong in humans that these deaf children begin to develop their own manual gestures called 'home sign' to express their thoughts and desires. This is discussed further in Chapter 8. The fact that these deaf children 'create' language suggests that language structure is based on innate linguistic knowledge.

Knowing more than one language

> He that understands grammar in one language, understands it in another as far as the essential properties of Grammar are concerned. The fact that he can't speak, nor comprehend, another language is due to the diversity of words and their various forms, but these are the accidental properties of grammar.
>
> Roger Bacon (1214–1294)

second-language (L2) acquisition The acquisition of another language or languages after first-language acquisition is underway or completed.

bilingual language acquisition The (more or less) simultaneous acquisition of two or more languages before the age of three years such that each language is acquired with native competency.

People can acquire a second language under many different circumstances. You may have learnt a second language when you began high school or university. Moving to a new country often means acquiring a new language. Some people live in communities or homes in which more than one language is spoken and may acquire two (or more) languages simultaneously. The term **second-language (L2) acquisition**, generally refers to the acquisition of a second language by someone (adult or child) who has already acquired a first language. **Bilingual language acquisition** refers to the (more or less) simultaneous acquisition of two languages beginning in infancy (or before the age of three years).

Australia has a very diverse population and, consequently, many bilingual speakers. In the Australian Bureau of Statistics 2016 census, 72.7 per cent of Australians reported speaking only English at home. This means as many as one in five households have a language other than English as their home language. According to the census figures, Mandarin is the most spoken non-English language, with 2.5 per cent of the population reporting it as their home language. Cantonese, another Chinese language, is spoken by 1.2 per cent of the Australian population at home. Other home languages include Arabic, at 1.4 per cent; Vietnamese, at 1.2 per cent; Italian, at 1.2 per cent of the population; and Greek, at 1.0 per cent.[6] Census statistics from New Zealand's 2018 census show a higher number of households speaking English at home: 95.4 per cent. English is followed by Māori, which is spoken by 4 per cent of the population. The next most spoken languages in New Zealand are Samoan, at 2.2 per cent; Northern Chinese, at 2 per cent; and Hindi at 1.5 per cent.[7]

Childhood bilingualism

Bilingual Hebrew–English-speaking child:	'I speak Hebrew and English.'
Monolingual English-speaking child:	'What's Hebrew?'

Approximately half of the people in the world are native speakers of more than one language. This means that as children they had regular and continued exposure to more than one language. In many parts of the world, especially in Africa and Asia, bilingualism (even multilingualism) is the norm. In contrast, many Western countries (though by no means all of them) view themselves as monolingual, even though they may be home to speakers of many languages.

Bilingualism is always an intriguing topic. People wonder how it is possible for a child to acquire two (or more) languages at the same time. There are many questions, such as: Doesn't the child confuse the two languages? Does bilingual language development take longer than monolingual development? Are bilingual children brighter, or conversely, does acquiring two languages negatively affect the child's cognitive development in some way? How much exposure to each language is necessary for a child to become bilingual?

Much of the early research into bilingualism focused on the fact that bilingual children sometimes mix the two languages in the same sentence, as the following examples from French–English bilingual children illustrate. In the first example, a French word appears in an otherwise English sentence. In the other two examples, all of the words are English but the syntax is French:

His nose is perdu.	(His nose is lost.)
A house pink	(A pink house)
That's to me.	(That's mine.)

In early studies of bilingualism, this kind of language mixing was viewed in a negative light. It was taken as an indication that the child was confused or having difficulty separating the two languages. In fact, many parents, sometimes on the advice of educators or psychologists, would stop raising their children bilingually when faced with this issue. It now seems clear that some amount of language mixing is a normal part of the early bilingual acquisition process and not necessarily an indication of any language problem.

Theories of bilingual development

Bilingual mixed utterances raise an interesting question about the grammars of bilingual children. Do bilingual children start out with only one grammar that is eventually differentiated, or do they construct a separate grammar for each language right from the start? The **unitary system hypothesis** proposes that children initially construct only one lexicon and one grammar. Mixed utterances, such as the ones just given, are often taken as support for this hypothesis. In addition, in the early stages, bilingual children often have words for particular objects in only one language. Spanish–English bilingual children, for example, may know the Spanish word for 'milk', *leche*, but not the English word, or they may have the word *water* but not 'agua'. This kind of complementarity has also been taken as support for the idea that the child has only one lexicon.

unitary system hypothesis
The hypothesis that a bilingual child initially constructs only one **lexicon** and one **grammar** for both (or all) languages being acquired.

However, careful examination of the vocabularies of bilingual children reveals that although they may not have exactly the same words in both languages, there is enough overlap to make the single-lexicon idea implausible. The reason children may not have the same set of words in both languages is that they use their two languages in different circumstances and acquire the vocabulary appropriate to each situation. Bilingual English–Chinese children may hear only Chinese during mealtimes and so they will first learn the Chinese words for foods, for example. Also, bilingual children initially have smaller vocabularies in each of their languages than the monolingual child has in his or her one language. This makes sense since a child can only learn so many words a day and the bilingual child has two lexicons to build. For these reasons, the bilingual child may have more lexical gaps than the monolingual child at a comparable stage of development and those gaps may be different for each language.

According to the **separate systems hypothesis** the bilingual child builds a distinct lexicon and grammar for each language. To test the separate systems hypothesis, it is necessary to look at how children acquire those pieces of grammar that are different in the two languages. If, for example, both languages have SVO word order, it would be more difficult to test this hypothesis. A number of studies have shown that where the two languages diverge, children acquire the different rules of each language. Spanish–English and French–German bilingual children have been shown to use the word orders appropriate to each language, as well as the correct agreement morphemes for each language. Other studies have shown that children set up two distinct sets of phonemes and phonological rules for their languages.

separate systems hypothesis
The hypothesis that the bilingual child builds a distinct **lexicon** and **grammar** for each language being acquired.

The separate systems hypothesis also receives support from the study of the LSQ–French bilinguals discussed earlier. These children had semantically equivalent words in the two languages, just as spoken–spoken bilinguals do. In addition, these children, like all bilingual children, were able to adjust their language choice to the language of their addressees, showing that they differentiated the two languages. Like most bilingual children, the LSQ–French bilinguals produced mixed utterances – utterances that had words from both languages. What is especially interesting is that these children showed simultaneous language mixing. They would produce an LSQ sign and a French word at the same time, something that is only possible if one language is spoken and the other signed. This finding has implications for bilingual language acquisition in general. It shows that the language mixing of bilingual children is not due to confusion but rather the result of two grammars operating simultaneously.

If bilingual children have two grammars and two lexicons, how are mixed utterances to be explained? Various explanations have been offered. One suggestion is that children mix because they have lexical gaps; if French–English bilingual children do not know the English word *lost*, they will use the word they do know, *perdu* – the 'any port in a storm' strategy. Another possibility is that the mixing in child language is like the special language usage of many adult bilinguals referred to as codeswitching (discussed in Chapter 9). In specific social situations, bilingual adults may switch back and forth between their two languages in the same sentence, for example, *I put the forks en las mesas* (*I put the forks on the tables*). Codeswitching reflects the grammars of both languages working simultaneously; it is not 'bad grammar' or 'broken English'. Adult bilinguals codeswitch only when speaking to other bilingual speakers. It has been suggested that the mixed utterances of bilingual children are a form of codeswitching. In support of this proposal, various studies have shown that bilingual children as young as two make contextually appropriate language choices: in speaking to monolinguals the children use one language; in speaking to bilinguals they mix the two languages.

Two monolinguals in one head

Although we must study many bilingual children to reach any firm conclusions, the evidence accumulated so far seems to support the idea that children construct multiple grammars at the outset. Moreover, it seems that bilingual children develop their grammars along the same lines as monolingual children. They go through a babbling stage, a holophrastic stage, a telegraphic stage and so on. During the telegraphic stage they show the same characteristics in each of their languages as the monolingual children: monolingual English-speaking children omit inflectional morphology in sentences such as *Eve play there* and *Andrew want that*, and German-speaking children use infinitives as in *S[ch]okolade holen*, 'chocolate get – infinitive'. Spanish- and Italian-speaking monolinguals rarely omit verbal inflection or use infinitives in this way. Remarkably, two-year-old German–Italian bilinguals use infinitives when speaking German but not when speaking Italian. Young Spanish–English bilingual children drop the English verb endings but not the Spanish ones, and German–English bilinguals omit verbal inflection in English and use the infinitive in German. Results such as these have led some researchers to suggest that the bilingual child is like 'two monolinguals in one head'. This is for the most part true, but it is also the case that one language can sometimes influence the other during language acquisition.

The role of input

One issue that concerns researchers studying bilingualism, as well as parents of bilingual children, is the relation between language input and proficiency. What role does input play in helping the child to separate the two languages? One input condition that is thought to promote bilingual development is *une personne–une langue*, 'one person–one language'. In this condition, each person – say, the mother and father – speaks only one language to the child. The idea is that keeping the two languages separate in the input will make it easier for the child to keep them separate. Whether this method affects bilingual development in some important way has not been established. In practice this 'ideal' input situation may be difficult to attain. It may also be unnecessary. We saw earlier that babies are attuned to various phonological properties of the input language, such as prosody and phonotactics. This may provide a sufficient basis for the bilingual child to keep the two languages separate.

Another question is: How much input does a child need in each language to become native in both? The answer is not straightforward. It seems intuitively clear that if children hear twelve hours of English a day and only two hours of Spanish, they will probably develop English much more quickly and completely than Spanish. In fact, under these conditions they may never achieve the kind of grammatical competence in Spanish that we associate with the normal monolingual Spanish speaker. In reality, bilingual children are raised in varying circumstances. Some may have more or less equal exposure to the two languages; some may hear one language more than the other but still have sufficient input in the two languages to become native in both; some may ultimately have one language that is dominant to a lesser or greater degree. Researchers simply do not know how much language exposure is necessary in the two languages to produce a balanced bilingual. For practical purposes, the rule of thumb is that the child should receive roughly equal amounts of input in the two languages to achieve native proficiency in both.

Cognitive effects of bilingualism

Another issue is the effect of bilingualism on intellectual or cognitive development. Does being bilingual make you more or less intelligent, more or less creative and so on? Historically, research into this question has been fraught with methodological problems and has often been heavily influenced by the prevailing political and social climate. Many early studies (before the 1960s) showed that bilingual children did worse than monolingual children on IQ and other cognitive and educational tests. The results of more recent research indicate that bilingual children outperform monolinguals in certain kinds of problem solving. Also, bilingual children seem to have better metalinguistic awareness. **Metalinguistic awareness** refers to a speaker's conscious awareness *about* language and the use of language. This is in contrast to linguistic knowledge, which, as we have seen, is knowledge *of* language and is unconscious. Bilingual children have an earlier understanding of the arbitrary relation between an object and its name, for instance, and they have sufficient metalinguistic awareness to speak the contextually appropriate language, as noted earlier.

metalinguistic awareness
A speaker's conscious awareness *about* language and the use of language, as opposed to linguistic *knowledge*, which is largely unconscious.

Whether children enjoy some cognitive or educational benefit from being bilingual seems to depend a great deal on extralinguistic factors, such as the social and economic position of the child's group or community, the educational situation and the relative 'prestige' of the two languages. Studies that show the most positive effects (e.g. better school performance) have generally involved children reared in societies where both languages are valued, and whose parents were interested in and supportive of their bilingual development.

Second-language acquisition

In contrast to bilinguals, many people are introduced to a second language (L2) after they have achieved native competence in a first language (L1). If you have had the experience of trying to master a second language as an adult, no doubt you found it to be a challenge, quite unlike your first-language experience.

Is L2 acquisition the same as L1 acquisition?

With some exceptions, adults do not simply pick up a second language. It usually requires conscious attention, if not intense study and memorisation, to become proficient in a second language. Again, with the exception of some remarkable individuals, adult second-language learners do not often achieve native-like grammatical competence in the second language, especially with respect to pronunciation. They generally have an accent and they may make syntactic or morphological errors that are unlike the errors of children acquiring their first language. Second-language learners often make word order errors, especially initially, as well as morphological errors in grammatical gender and case. Errors made in the second language may **fossilise** so that no amount of teaching or correction can undo them.

fossilisation

A characteristic of second-language learning in which the learner reaches a plateau and seems unable to acquire some property of the L2 **grammar**.

Unlike first language acquisition, which is successful across typically-developing children and languages, adults vary considerably in their ability to acquire a second language completely. Some people are very talented language learners; others are hopeless. Most people fall somewhere in the middle. Success may depend on a range of factors, including age, talent, motivation and whether the learner is in the country where the language is spoken versus sitting in a classroom five mornings a week with no further contact with native speakers. For all these reasons, many people, including many linguists who study L2 acquisition, believe that second-language acquisition is something different from first-language acquisition. This hypothesis is referred to as the **fundamental difference hypothesis** of L2 acquisition.

fundamental difference hypothesis

The hypothesis that **second-language (L2) acquisition** differs fundamentally from first-language (L1) acquisition.

In certain important respects, however, second-language acquisition is like children's acquisition of their first language. Like children acquiring their first language, second-language learners do not acquire their second language overnight; they go through stages. Like children, second-language learners construct grammars that reflect their competence in the L2 at each stage and so their language at any particular point, though not native-like, is rule-governed and not haphazard. The intermediate grammars that L2ers create on their way to the target have been called **interlanguage grammars**.

interlanguage grammar

The intermediate **grammar** that a second-language learner creates on the way to acquiring the (more or less) complete **grammar** of the target language.

Consider word order in the interlanguage grammars of Romance-language (Italian, Spanish and Portuguese) speakers acquiring German as a second language. The word order of the Romance languages is Subject–(Auxiliary)–Verb–Object (as it is in English). German has two basic word orders, depending on the presence of an auxiliary. Sentences with auxiliaries have Subject–Auxiliary–Object–Verb word order, as in (1) in the following examples; sentences without auxiliaries have Subject–Verb–Object word order, as in (2). (Note that as with the child data above, these L2 sentences may contain various 'errors' in addition to the word-order facts we are considering.)

1 Hans hat ein Buch gekauft.	Hans has a book bought.
2 Hans kauft ein Buch.	Hans bought a book.

Studies show that Romance speakers acquire German word order in pieces. During the first stage they use German words but the S–Aux–V–O word order of their native language, as follows:

Stage 1	Mein Vater hat gekauft ein Buch.
	'My father has bought a book.'

At the second stage, they acquire the VP word order Object–Verb:

Stage 2	Vor Personalrat auch meine helfen.
	In the personnel office [a colleague] me helped.
	'A colleague in the personnel office helped me.'

At the third stage, they acquire the rule that places the verb or (auxiliary) in second position:

Stage 3	Jetzt kann sie mir eine Frage machen.
	Now can she me a question ask.
	'Now she can ask me a question.'
	I kenne nicht die Welt.
	I know not the world.
	'I don't know the world.'

These stages differ from those of children acquiring German as a first language. For example, German children know from the start that the language has SOV word order.

Like children acquiring their first language, second-language learners attempt to uncover the grammar of the target language. Second language learners have varying success, however, and often do not reach the target. Proponents of the fundamental difference hypothesis believe that second-language learners construct grammars according to different principles than those used in child language acquisition; principles that are not specifically designed for language acquisition but for problem-solving tasks, such as playing chess or learning maths. According to this view, second-language learners lack access to the specifically linguistic principles of UG that children have to help them. On the other hand, usage-based researchers believe that both second-language learners and children learn using mechanisms that are 'domain-general' and not specially designed for language acquisition.

Others have noted that adults are superior to children in solving all sorts of non-linguistic problems using domain-general learning mechanisms. If they were using these problem-solving skills to learn their L2, shouldn't they be uniformly more successful than they are? Also, linguistic savants, such as Christopher, to be discussed in Chapter 8, are evidence against the view that L2 acquisition involves only non-linguistic cognitive abilities. Christopher's IQ and problem-solving skills are minimal at best, yet he has become proficient in several languages.

Many L2 acquisition researchers reject the idea that L2 acquisition is fundamentally different from child language acquisition. They point to various studies that show that interlanguage grammars do not generally violate principles of UG, which makes the process seem more similar to first language acquisition. In the German L2 examples above, the interlanguage rules may be wrong for German or wrong for Romance, but they are not impossible rules. These researchers also note that although second-language learners may fall short of first-language learners in terms of their final grammar, they may acquire rules in the same way as in child language acquisition.

Native language influence in L2 acquisition

One respect in which first-language acquisition and second-language acquisition are clearly different is that adult L2ers already have a fully developed grammar of their first language. As discussed in Chapter 1, linguistic competence is unconscious knowledge. We cannot suppress our ability to use the rules of our language. We cannot decide not to understand English. Similarly, L2 speakers – especially at the beginning stages of acquiring their L2 – seem to rely on their L1 grammar to some extent. This is shown by the kinds of errors L2 speakers make, which often involve the **transfer of grammatical rules** from their L1. This is most obvious in phonology. L2 speakers generally speak with an accent because they may transfer the phonemes, phonological rules, syllable structure and prosody of their first language to their second language. We see this in the Japanese speaker who does not distinguish between *rip* [ɹɪp] and *lip* [lɪp] because the

transfer of grammatical rules
The application of rules from one's first language to a second language that one is attempting to acquire. The 'accent' that second-language learners have is a result of the transfer of first-language phonetic and phonological rules.

distinction between *r* and *l* is not phonemic in Japanese. It is also evident in the French speaker who says *ze cat in ze hat* because French does not have [ð]; in the German speaker who devoices final consonants, saying [hæf] for *have*; and in the Spanish speaker who inserts a schwa before initial consonant clusters, as in [əskɪl] for *skill* and [əsnæk] for *snack*.

Similarly, English speakers may have difficulty with unfamiliar sounds in other languages. In Italian, for example, long (or double) consonants are phonemic. Italian has minimal pairs, such as:

ano	anus	anno	year
pala	shovel	palla	ball
dita	fingers	ditta	company

English-speaking L2 learners of Italian have difficulty in hearing and producing the contrast between long and short consonants. This can lead to embarrassing situations; for example, when, on New Year's Eve, instead of wishing people *buon anno* ('a good year'), you wish them *buon ano* (a phrase with a very different meaning!).

Native-language influence is also found in the syntax and morphology. Sometimes this influence shows up as a wholesale transfer of a particular piece of grammar. A Spanish speaker acquiring English might, for example, drop subjects in non-imperative sentences because this is possible in Spanish, as illustrated by the following examples:

Hey, is not funny.

In here have the mouth.

Live in Colombia.

Or speakers may begin with the word order of their native language, as we saw in the Romance–German interlanguage examples.

Native-language influence may show up in more subtle ways. People whose L1 is German, for example, acquire English yes–no questions faster than Japanese speakers do because German has a verb movement rule for forming yes–no questions that is very close to the English Aux movement rule, while in Japanese there is no similar movement rule for question formation.

The creative component of L2 acquisition

It would be an oversimplification to think that second-language acquisition involves only the transfer of L1 properties to the L2 interlanguage. There is a strong creative component to second-language acquisition. Many language-particular parts of the first-language grammar do not transfer. Items that a speaker considers irregular, infrequent or semantically difficult are not likely to transfer to the L2. Speakers will not, for example, typically transfer L1 idioms such as *He hit the roof*, meaning 'He got angry'. They are more likely to transfer structures in which the semantic relations are transparent. A structure such as (1), say, will transfer more readily than (2):

1 It is awkward to carry this suitcase.

2 This suitcase is awkward to carry.

In (1), the NP 'this suitcase' is in its logical direct-object position, whereas in (2) it has been moved to the subject position away from the verb that selects it.

Many of the errors that second-language learners make are not derived from their L1. In one study, Turkish speakers at a particular stage in their development of German used S–V–Adv (Subject–Verb–Adverb) word order in embedded clauses (the *wenn* clause in the following example) in their German interlanguage, even though both their native language and the target language have S–Adv–V order:

Wenn	ich	Geh	zurück	ich	arbeit	Elektriker	in der Türkei
If	I	go	back,	I	work (as an)	electrician	in (the) Turkey

(Cf. *Wenn ich zurück gehe, arbeite ich (als) Electriker*, which is grammatically correct German.)

The embedded S–V–Adv order is most likely an overgeneralisation of the verb-second requirement in main clauses that we discussed above. As we noted earlier, overgeneralisation is a clear indication that a rule has been acquired.

Why certain L1 rules transfer to the interlanguage grammar and others do not is not well understood. It is clear, however, that although construction of the L2 grammar is influenced by the L1 grammar, there are also developmental principles – possibly universal – that operate in L2 acquisition. This is best illustrated by the fact that speakers with different L1s go through similar L2 stages. Turkish, Serbo-Croatian, Italian, Greek and Spanish speakers acquiring German as an L2 all drop articles to some extent. Since some of these L1s have articles, this cannot be due to transfer but must involve some more general property of language acquisition.

Heritage-language learners

Heritage-language learners are a particular kind of adult language learner. A heritage language learner is someone who was raised with a strong cultural connection to a language through family interaction – for example, a language, such as Polish, spoken by grandparents who were immigrants – and who decides at some point to study that language more formally, for example, at university.

heritage language
A language with which a person has a strong cultural connection through family interaction, but which is not learnt natively, e.g. Yiddish in a Jewish household.

The heritage-language learner may have no prior linguistic knowledge of the language, or he or she may be bilingual to some degree in the heritage language (his or her weaker language) and the dominant language – that is, the language of the broader community, for example, English. Often heritage-language learners are exposed to the heritage language in childhood and then switch to another dominant language later in life, for example, when they enter school. At this point they may begin to lose the heritage language – a process known as **language attrition**. On the other hand, the heritage language may be maintained if the speaker continues to use it alongside the dominant language, in his or her home or community. Sometimes a heritage-language learner may speak the language but be unable to either read or write it because he or she was educated only in the dominant language.

language attrition
The gradual loss of **heritage-language** competence owing to lack of use.

There has been growing interest in the language abilities of heritage-language learners, especially in the extent to which early exposure to a (heritage) language might enhance a person's ability to later become proficient in that language. Preliminary results suggest that the length and manner of exposure to the heritage language in childhood are important determinants of later proficiency. Learners who have consistent exposure to the language until the end of the critical period (roughly puberty) have an advantage over other L2 learners of that language, especially in the areas of phonology and lexicon. Also, studies show that parents' attitude towards the home language and culture correlate with children's later ability in the heritage language.

Is there a critical period for L2 acquisition?

> I don't know how you manage, Sir, amongst all the foreigners; you never know what they are saying. When the poor things first come here they gabble away like geese, although the children can soon speak well enough.
>
> Margaret Atwood, *Alias Grace*, 1996

Age is a significant factor in L2 acquisition. The younger a person is when exposed to a second language, the more likely he or she is to achieve native-like competence.

In an important study of the effects of age on ultimate attainment in L2 acquisition, Jacqueline Johnson and Elissa Newport tested several groups of Chinese and Korean speakers who had acquired English as a second language.[8] The subjects, all of whom had been in the US for at least five years, were tested on their knowledge of specific aspects of English morphology and syntax. They were asked to judge the grammaticality of sentences such as:

The little boy is speak to a policeman.

The farmer bought two pig.

A bat flewed into our attic last night.

Johnson and Newport found that the test results depended heavily on the age at which the person had arrived in the US. The people who arrived as children (between the ages of three and eight) did as well on the test as American native speakers. Those who arrived between the ages of eight and fifteen did not perform like native speakers. Moreover, every year seemed to make a difference for this group. The person who arrived at age nine did better than the one who arrived at age ten, those who arrived at age eleven did better than those who arrived at age twelve and so on. The group that arrived between the ages of 17 and 31 had the lowest scores.

Does this mean that there is a critical period for L2 acquisition, an age beyond which it is *impossible* to acquire the grammar of a new language? Most researchers would hesitate to make such a strong claim. Although age is an important factor in achieving native-like L2 competence, it is certainly possible to acquire a second language as an adult. Indeed, many teenage and adult L2 learners become quite proficient, and a few highly talented ones even manage to pass for native speakers. Also, the Newport and Johnson studies looked at the end state of L2 acquisition, after their subjects had been in an English-speaking environment for many years. It is possible that the ultimate attainment of adult L2ers falls short of native competence, but that the process of L2 acquisition is not fundamentally different from L1 acquisition.

It is more appropriate to say that there is a gradual decline in L2 acquisition abilities with age and that there are sensitive periods for the native-like mastery of certain aspects of the L2. The sensitive period for phonology is the shortest. To achieve native-like pronunciation of an L2 generally requires exposure during childhood. Other aspects of language, such as syntax, may have a larger window.

Research with heritage-language learners provides additional support for the notion of sensitive periods in second-language acquisition. Psychologist Terry Au and her colleagues investigated the acquisition of Spanish by university students who had overheard the language as children (and sometimes knew a few words) but who did not otherwise speak or understand Spanish.[9] The overhearers were compared to people who had no exposure to Spanish before the age of 14. All of the students were native speakers of English studying their heritage language as a second language. Au's results showed that the overhearers acquired a native-like accent whereas the other students did not; however, the overhearers did not show any advantage in acquiring the grammatical morphemes of Spanish. Early exposure may leave an imprint that facilitates the late acquisition of certain aspects of language.

Recent research on the neurological effects of acquiring a second language shows that left hemisphere cortical density is increased in bilinguals relative to monolinguals and that this increase is more pronounced in early versus late second-language learners. The study also shows a positive relationship between brain density and second-language proficiency. The researchers conclude that the structure of the human brain is altered by the experience of acquiring a second language.

CHAPTER REVIEW

Summary

When children acquire a language, they acquire the grammar of that language – the phonological, morphological, syntactic and semantic rules. They also acquire the pragmatic rules of the language as well as a lexicon. Children extract the rules (and much of the lexicon) from the language around them. The question is whether their innate linguistic knowledge guides them in acquiring their language, or whether they are using general cognitive principles. According to the UG theory of acquisition, innate linguistic knowledge guides children, whereas usage-based language-acquisition researchers, including those working in the constructivist framework, would claim that children are using general cognitive principles to learn language.

Usage-based language acquisition theories propose that children keep records of adult speech and attempt to match it. Once they need to be creative, analogy is a useful mechanism to help children go beyond the input they have heard. Furthermore, corrective feedback in the form of recasts helps children bring their grammar closer to the adult model. As they stand, these learning mechanisms are not sufficient to explain how children acquire exactly the same grammar as adults in their community, but researchers working in the constructivist framework are actively working to refine these mechanisms.

Researchers working within the UG framework point to the ease and rapidity of children's language acquisition and the uniformity of the stages of development for all children and all languages, despite the poverty of the stimulus they receive. According to UG language-acquisition researchers, these facts suggest that the language faculty is innate and that the infant comes to the complex task already endowed with a UG. UG provides the principles to which all human languages conform and the parameters that account for language diversity. On this view, language acquisition is a creative process.

Children may acquire more than one language at a time. Bilingual children seem to go through the same stages as monolingual children except that they develop two grammars and two lexicons simultaneously. This is true for children acquiring two spoken languages as well as for children acquiring a spoken language and a sign language. Whether the child will be equally proficient in the two languages depends on the input he or she receives and the social conditions under which the languages are acquired.

In **second language acquisition**, L2 learners construct grammars of the target language – called **interlanguage grammars** – that go through stages, like the grammars of first-language learners. Influence from the speaker's first language makes L2 acquisition appear different from L1 acquisition. Adults often do not achieve native-like competence in their L2, especially in pronunciation, though child L2 learners typically do. The difficulties encountered in attempting to learn languages after puberty may be because there are sensitive periods for L2 acquisition. Some theories of second language acquisition suggest that the same principles operate that account for first language acquisition. A second view suggests that the acquisition of a second language in adulthood involves general learning or cognitive mechanisms rather than the specifically linguistic principles used by children.

The universality of the language acquisition process, the stages of development, and the relatively short period in which the child constructs a complex grammatical system without overt teaching suggest that the human species is innately endowed with special language acquisition abilities and that language is based in human biology.

All normal children learn whatever language or languages they are exposed to, from Afrikaans to Zuni. This ability is not dependent on race, social class, geography, or even intelligence (within a normal range). This ability is uniquely human.

Exercises

1 Infant-directed speech (IDS), or 'baby talk', is a term used to label the word forms that many adults use when speaking to toddlers or infants. Examples in English are *choo-choo* for 'train' and *bow-wow* for 'dog'. IDS seems to exist in every language and culture. At least two things seem to be universal about baby talk: the words that have baby-talk forms fall into certain semantic categories (e.g. food and animals), and the words are phonetically simpler than the adult forms (e.g. /tɐmi:/ /tʌmi/ for /stɐmɪk/ /stʌmɪk/).

List all the baby-talk words you can think of in your native language, then:

a separate them into semantic categories

b try to state general rules for the kinds of phonological reductions or simplifications that occur.

2 In the holophrastic (one-word) stage of child language acquisition, the child's phonological system differs in systematic ways from that of the adult grammar. The inventory of sounds and the phonemic contrasts are smaller, and there are greater constraints on phonotactic rules (see Chapter 3 for discussion on these aspects of phonology).

a For each of the following words produced by a child, state what the substitution is. All the substitutions involve consonants.

Example:		
spook	(adult) [spʉ:k]	substitution: initial cluster [sp] reduced to single
	(child) [pʰʉ:k]	consonant; /p/ becomes aspirated, showing that child has acquired aspiration rule

i	don't	[dəʉt]
ii	skip	[kʰɪp]
iii	shoe	[sʉ:]
iv	that	[dæt]
v	play	[pʰæɪ]
vi	thump	[dɐp]
vii	bath	[bɐ:t]
viii	chop	[tʰɔp]
ix	light	[wɑet]
x	dolly	[dɔwi:]
xi	grow	[gəʉ]

b State general rules that account for the child's deviations from the adult pronunciations.

3 The following words are from the lexicons of two children aged one year and six months (1;6) and two years (2;0). Compare the pronunciation of the words to adult pronunciation. Assume Australian English pronunciation.

Adult							
light	[lɑet]	bead	[bi:d]	soap	[səʉp]	dog	[dɔg]
sock	[sɔk]	pig	[pʰɪg]	feet	[fi:t]	shoes	[ʃʉ:z]
geese	[gi:s]	cheese	[tʃi:z]	goose	[gʉ:s]		
fish	[fɪʃ]	biz	[bɪz]	dish	[dɪʃ]		
sheep	[ʃi:p]	bib	[bɪb]	slide	[slɑed]		

Child 1 (1;6)				**Child 2 (2;0)**			
sock	[kɔk]	goose	[gʉ:s]	light	[wɑet]	bead	[bi:]
cheese	[tʃi:s]	dish	[dɪtʃ]	sock	[sɔk]	pig	[pek]
feet	[bi:t]	slide	[dɑe]	geese	[gi:s]	cheese	[ti:s]
bib	[be]	dog	[dɔ]	fish	[fɪs]	biz	[bɪs]
soap	[dəʉp]	shoes	[dʉ:s]	sheep	[ʃi:p]	bib	[bɪp]

a What happens to final consonants in the language of these two children? Formulate the final consonant rule(s) in words. Do all final consonants behave the same way? If not, which consonants undergo the rule(s)? Is this a natural class?

b On the basis of these data, are there any pairs of words that allow you to identify any of the phonemes in the grammars of these children? What are they? Explain how you were able to determine your answer.

4 Roger Brown and his co-workers at Harvard University studied the language development of three children, referred to in the literature as Adam, Eve and Sarah. The following are samples of their utterances during the two-word stage:

a	a coat	f	my stool	k	poor man
b	a celery	g	that knee	l	little top
c	a Becky	h	more coffee	m	dirty knee
d	a hands	i	more nut	n	that Adam
e	my mummy	j	two tinker-toy	o	big boot

One observation made by Brown was that many of the sentences and phrases produced by the children were ungrammatical from the point of view of the adult grammar. Mark with an asterisk any of the above noun phrases that are ungrammatical in the adult grammar of English and state what is wrong with each starred item. If, for example, one of the utterances was *lotsa book* you might say, 'The modifier *lotsa* must be followed by a plural noun'.

5 Following is a list of utterances recorded from Sammy at age two years and six months (2;6):

a	Mikey not see him.	m	That my toy.
b	Where ball go?	n	Him sleeping.
c	Look Mummy, doggie.	o	Want more milk.
d	Big doggie.	p	Read moon book.
e	He no bite ya.	q	Me want that.
f	He eats mud.	r	Teddy up.
g	Kitty hiding.	s	Daddy 'puter.
h	Grampie wear glasses.	t	'Puter broke.
i	He funny.	u	Cookies and milk!!!
j	He loves hamburgers.	v	Me Superman.
k	Daddy ride bike.	w	Mummy's angry.
l	That's mines.	x	Allgone kitty.

i What stage of language development is Sammy in?

ii Calculate the number of morphemes in each of Sammy's utterances.

iii What is Sammy's MLU in morphemes? In words?

iv **Challenge exercise:** Deciding the morpheme count for several of Sammy's words requires some thought. For each of the following, determine whether it should count as one or two morphemes and why:

- allgone
- glasses
- cookies

6 We saw in this chapter how children overgeneralise rules, such as the plural rule, which leads them to produce forms such as *mans* or *mouses*. What might a child learning English use instead of the following adult words?

a	children	f	sang
b	went	g	geese
c	better	h	worst
d	best	i	knives
e	brought	j	worse

7 Make up a 'wug test' similar to the one described in this chapter to test a child's knowledge of the following morphemes. In each case, you provide a picture and describe it. A second picture depicts the property you are trying to test. Remember that the 'lead-in' sentence that you give to a child cannot model the morpheme that you are testing.

Comparative	er (as in *bigger*)
Superlative	est (as in *biggest*)
Progressive	ing (as in [I am] *dancing*)
Agentive	er (as in *writer*)

8 Imagine that a two-year-old child is exposed to the following list of sentences in the input and hears similar ones frequently:

Daddy ate a banana with his fingers.
Mummy ate her dinner with a fork.
Lucy ate cereal with a spoon.
Max ate dumplings with chopsticks.
Grandma ate her peas with a knife and fork.

a Assuming the usage-based constructivist theory of acquisition, suggest how a child might develop a representation for this construction over time.

b Assuming the theory of Universal Grammar, suggest what the hierarchical representation for this structure would be for children.

9 English-speaking children often omit auxiliary verbs, and this omission extends to their questions in examples such as *Where doggie go?* and *What daddy doing?*

a How would researchers, assuming the usage-based constructivist theory of language acquisition, explain children's productions of these structures? How are they formed?

b Assuming the theory of Universal Grammar, and using the PS rules you learnt in Chapter 5, draw phrase structure trees for the yes–no questions *Can doggie go?* and *Is daddy drinking coffee?* What transformational rule do you need to use?

c **Challenge exercise:** Assuming the theory of Universal Grammar, what do you think would be the best way to represent yes–no questions like *Mummy want coffee?* and *I play truck?* at this same stage of language acquisition?

10 In Chapter 5, we introduced the Aux-movement rule (move Aux to C) that applies in yes–no questions and *wh*-questions. An interesting point about this rule is that it does not apply in embedded clauses. We do not say *Do you know what is the time?* or *What do you think can Spiderman jump over?*

a Assuming the usage-based constructivist theory of language acquisition, would you predict children would produce such questions?

b Assuming the theory of Universal Grammar, would you predict children might make errors of this kind?

11 One structure that is acquired quite late in English-speaking children is the passive structure (refer to Chapter 5 for discussion). Researchers have found that children use 'short' passives without a by-phrase before ones with a by-phrase. Some examples are given below:

Short passives:	Passives with a by-phrase:
My Lego got knocked down!	The Incredible Hulk was pushed by the guard
My finger got burnt	He was scratched by the bush
This truck is broken	She got knocked down by the Smurf

Here are two potential explanations of why passives, and in particular passives with by-phrases are late.

- Explanation 1: Passives are learnt late by children because they are infrequent in the input. Passives with by-phrases are later than short passives because they are even more infrequent in the input to children.
- Explanation 2: Children have the grammatical knowledge to be able to represent passive structures. They tend to use short passives rather than ones with a by-phrase because a short passive is sufficient in most pragmatic situations.

a Which of these explanations is aligned more closely with the usage-based theory of acquisition and which is aligned more closely with the theory of Universal Grammar?

b **Challenge exercise:** Are these two explanations mutually exclusive? In other words, are there parts of each explanation that both theories of language acquisition would agree on? What would they not agree on?

12 The following sentences were uttered by children in the telegraphic stage:

Language	Child's utterance	Gloss	Translation
Swedish	Se, blomster har	Look flowers have	Look, (I) have flowers.
English	Tickles me	Tickles me	(It) Tickles me.
French	Mange du pain	Eat some bread	S/he eats some bread.
German	S[ch]okolade holen	Chocolate get	I/we get chocolate.

In each of the children's sentences, the subject is missing, although this is not grammatical in the respective adult languages (in contrast to languages such as Spanish and Italian, in which it is grammatical to omit the subject).

a Develop two hypotheses as to why the child might omit sentence subjects during this stage. One hypothesis might be 'Children are limited in the length of sentence they can produce, so they drop subjects'.

b Evaluate the different hypotheses. An objection to the hypothesis given in (a) might be 'If length is the relevant factor, why do children consistently drop subjects but not objects?'

13 The following are some pronunciations by Japanese speakers learning English as a second language:

fuss	[fasu]
bath	[basu]
bun	[banu]

What do these examples tell you about the syllable structure of Japanese? What consonant and vowel phonemes do they suggest are absent from Japanese?

14 Many Arabic speakers tend to insert a vowel in their pronunciation of English words. This is called *epenthesis*. In the following example, the first column has simplified examples from second-language speakers whose first language is Egyptian Arabic and the second column from second-language speakers whose first language is Iraqi Arabic. In these examples Australian English vowels and consonants are generally used. Actual data from second-language speakers may include additional variations to the vowels and the consonants that we have not represented here. Note that [r] is the alveolar trill.

L1 = Egyptian Arabic		L1 = Iraqi Arabic	
[bilæstik]	plastic	[iflo]	floor
[θiri]	three	[ibleɪn]	plane
[tirænsileɪt]	translate	[tʃilidren]	children
[silaɪd]	slide	[iθri]	three
[fired]	Fred	[istadi]	study
[tʃildiren]	children	[ifred]	Fred

a What vowel do the Egyptian Arabic speakers insert and where?
b What vowel do the Iraqi Arabic speakers insert and where?
c Based on the position of the epenthetic vowel in the third example, can you guess which list below, A or B, belongs to Egyptian Arabic and which belongs to Iraqi Arabic?

Arabic A		Arabic B	
kitabta	I wrote to him	katabtu	I wrote to him
kitabla	He wrote to him	katablu	He wrote to him
kitab*i*tla	I wrote to him	katabt*i*lu	I wrote to him

15 In contrast to English, Cantonese is a language in which *wh*-phrases do not move to the CP phrase; they remain 'in situ', that is, unmoved. Here is an example. The numbers in the Cantonese refer to tones, and PFV refers to a perfective marker, indicating that the eating is finished.

What did you eat?
Lei5 sik6-zo2 mat1je5?
you eat-PFV what
'What did you eat?'

Here are some data from two bilingual Cantonese-English children at 2- and 3-years-old. At this stage, the child was dominant in Cantonese. Unlike monolingual English-speaking children, when speaking English, these children went through a stage of asking questions with the *wh*-word in situ.

This is on the what? (Child 1 2;04)
You go to the what? (Child 1 2;05)
The snail why live in the water? (Child 1 3;04)
You are doing what? (Child 2 3;06)
This is for making what? (Child 2 3;09)

a What process discussed in the chapter are these data supporting?
b **Challenge exercise:** English-speakers can produce questions in which the *wh*-phrase is in situ – these are called 'echo questions'. This type of question usually occurs when the person asking the echo-question did not hear, or is confirming a previous utterance, as in:
Person 1: I forgot to bring the keys.
Person 2: You forgot to bring what?
Could the Cantonese-bilingual children simply be asking echo questions? Use the following dialogue to inform your answer:

Child:	It is for what (Child 1 2;05)
Father:	What is it for?
Child:	What is it for what?
	It is for what?
	What is this for?

Further reading

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Weblinks

- www.talkbank.org – This website houses cross-linguistic corpora on child language, multilingualism and clinical populations, as well as software that enables searches of the corpus data.
- http://wordbank.stanford.edu – A database of children's vocabulary development that explores norms and trajectories for word learning.
- https://www.asha.org/public/speech/development – Information about many aspects of typical speech and language development on the American Speech-Language Hearing Association website.
- http://www.viviancook.uk/SLA/index.htm – Maintained by Vivian Cook, this page introduces many interesting topics in second language acquisition, such as Cook's Instant Accent test, L2 acquisition of vocabulary, motivation test, and codeswitching.

Endnotes

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2 Brown, R 1973, *A first language: The early stages*, Harvard University Press, Cambridge, MA.

3 Gleitman, L R and Wanner, E 1982, *Language acquisition: The state of the state of the art*, Cambridge University Press, Cambridge: 10.

4 Forshaw, B, Davidson, L, Kelly, B, Nordlinger, R, Wigglesworth, G, and Blythe, J 2017, 'The acquisition of Murrinhpatha (Northern Australia)'. In M Fortescue, M Mithun and N Evans (eds), *The Oxford handbook of polysythesis*, Oxford University Press, Oxford, UK.

5 Nordlinger, R 2017 'The languages of the Daly River region (Northern Australia)', In M Fortescue, M Mithun and N Evans (eds), *The Oxford handbook of polysythesis*, Oxford University Press, Oxford, UK.

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9 Au, T, Knightly, L, Jun, S-A, and Oh, J 2002, 'Overhearing a language during childhood', *Psychological Science*, 13: 238–243.

8 Language processing and the human brain

> No doubt a reasonable model of language use will incorporate, as a basic component, the generative grammar that expresses the speaker–hearer's knowledge of the language; but this generative grammar does not, in itself, prescribe the character or functioning of a perceptual model or a model of speech production.
>
> Noam Chomsky, *Aspects of the Theory of Syntax*, 1965

Learning objectives

After reading Chapter 8, you should be able to:

- understand the processes involved in the perception and comprehension of the speech signal and in lexical access
- understand how listeners build structural representations of sentences and how they deal with temporary ambiguities
- gain insight from speech errors into how speakers plan utterances
- understand aspects of the architecture of the brain and the localisation of language
- understand how brain imaging methodologies contribute to neural evidence of grammatical phenomena
- explain how the left hemisphere lateralisation of the brain can be tempered by brain plasticity in children
- recognise the effects of delayed exposure to language and the creative aspect of language in young children
- explain how different populations contribute to the evidence for the modularity of language and cognition.

psycholinguistics The branch of linguistics concerned with **linguistic performance**, language acquisition, and speech production and comprehension.

neurolinguistics The branch of linguistics concerned with the brain mechanisms that underlie the acquisition and use of human language; the study of the neurobiology of language.

In this chapter we introduce two areas of linguistic study – psycholinguistics and neurolinguistics. **Psycholinguistics** is the area of linguistics that is concerned with linguistic performance – how we use our linguistic competence – in speech (or sign) production and comprehension. The human brain not only acquires and stores the mental lexicon and grammar but accesses that linguistic storehouse to speak and understand language in real time.

As a listener, we access the lexicon and grammar to assign a structure and meaning to the sounds we hear. We also connect the sentences we hear into a mental model of the discourse, relying on both our linguistic and real-world knowledge. As a speaker, we access our lexicon and use the rules of grammar to construct novel sentences and to produce the sounds that express the message we wish to convey. Psycholinguistic studies investigate how humans accomplish this. A theory of linguistic performance tries to detail the psychological mechanisms that work with the grammar to permit language production and comprehension.

The study of the biological and neural foundations of language is called **neurolinguistics**. Like psycholinguistics, neurolinguistics is largely an experimental science. Neurolinguistic research is often based on data from atypical or impaired language and uses such data to understand properties of human language in general. Neurolinguists draw on data from aphasia, dyslexia and case studies of individuals who have undergone neurological procedures or whose development of language has been delayed due to deafness or other circumstances.

Comprehension of speech

> 'I quite agree with you,' said the Duchess; 'and the moral of that is – "Be what you would seem to be" – or, if you'd like it put more simply – "Never imagine yourself not to be otherwise than what it might appear to others that what you were or might have been was not otherwise than what you had been would have appeared to them to be otherwise".' 'I think I should understand that better,' Alice said very politely, 'if I had it written down: but I can't quite follow it as you say it.'
>
> Lewis Carroll, *Alice's Adventures in Wonderland*, 1865

Understanding a sentence involves analysis at many levels. To begin with, we must comprehend the individual speech sounds we hear. We are not conscious of the complicated processes we use to understand speech any more than we are conscious of the complicated processes of digesting food and utilising nutrients. We must study these processes deliberately and scientifically.

The sentence uttered by the Duchess in the previous quote provides an example of a grammatical sentence that is difficult to understand. The sentence is very long and it contains several words that require additional resources to process; for example, multiple uses of negation and words such as *otherwise*. Alice notes that if she had a pen and paper she could unpack this sentence more easily. One of the aims of psycholinguistics is to describe the processes people normally use in speaking and understanding language. The various breakdowns in performance, such as tip-of-the-tongue phenomena, speech errors and failure to comprehend tricky sentences, can tell us a great deal about how the language processor works, just as children's acquisition errors tell us a lot about the mechanisms involved in language development. But before we get to these issues, let us examine first how we segment the speech that we hear.

The speech signal

How do we understand the individual sounds that we hear? Put differently, how do we segment the **acoustic signal**? To understand this process, some knowledge of the signal itself can be helpful.

acoustic signal
The sound waves produced by any sound source, including speech.

In Chapter 2 we described speech sounds according to the ways in which they are produced. These involve the position of the tongue, the lips and the velum; the state of the vocal folds; the airstream mechanisms; whether the articulators obstruct the free flow of air and so on. All of these articulatory characteristics are reflected in the physical characteristics of the sounds produced.

Speech sounds can also be described in physical, or **acoustic**, terms. Physically, a sound is produced whenever there is a disturbance in the position of air molecules. The question asked by ancient philosophers as to whether a sound is produced if a tree falls in the middle of the forest with no-one to hear it has been answered by the science of acoustics. Objectively, a sound is produced; subjectively, no sound is heard. In fact, there are sounds we cannot hear because our ears are not sensitive to the full range of frequencies. Acoustic phonetics is concerned only with speech sounds, all of which can be heard by the normal human ear.

acoustic
Pertaining to physical aspects of sound.

When we push air out of the lungs through the glottis, it causes the vocal folds to vibrate; this vibration produces pulses of air that escape through the mouth (and sometimes also the nose). These pulses are actually small variations in the air pressure due to the wavelike motion of the air molecules.

The sounds we produce can be described in terms of how fast the variations of air pressure occur, which determines the **fundamental frequency** of the sounds and is perceived by the hearer as pitch. We can also describe the magnitude, or **intensity**, of the variations, which determines

fundamental frequency
In speech, the rate at which the vocal folds vibrate, symbolised as F0, called F-zero, perceived by the listener as **pitch**.

intensity
The magnitude of an acoustic signal, which is perceived as loudness.

the loudness of the sound. The quality of the speech sound – whether it is an [iː] or an [ɐː] or whatever – is determined by the shape of the vocal tract when air is flowing through it. This shape modulates the sound from the glottis into a spectrum of frequencies of greater or lesser intensity, and the particular combination of 'greater or lesser' is heard as a particular sound. (Imagine smooth ocean waves with regular peaks and troughs approaching a rocky coastline. As they crash on the rocks they are 'modulated' or broken up into dozens of 'subwaves' with varying peaks and troughs. That is similar to what is happening to the glottal pulses as they 'crash' through the vocal tract.)

Computer programs can be used to decompose the speech signal into its frequency components. When speech is fed into a computer (from a microphone or a recording), an image of the speech signal is displayed. The patterns produced are called **spectrograms** or sometimes **voiceprints**. A spectrogram of the words *heed*, *head*, *had* and *who'd* produced by a speaker with a British accent is shown in **Figure 8.1**.

spectrogram (voiceprints)
A visual representation of speech decomposed into component frequencies, with time on the *x* axis, frequency on the *y* axis and intensity portrayed on a greyscale – the darker, the more intense.

Time in milliseconds moves horizontally from left to right on the *x* axis; the *y* axis represents frequency. An increase in the intensity of each frequency component is indicated by a corresponding increase in the darkness of the trace. Each vowel is characterised by a number of dark bands that differ in their placement according to their frequency. They represent the strongest harmonics (or subwaves) produced by the shape of the vocal tract and are called the **formants** of the vowels. (A harmonic is a special frequency that is a multiple [2, 3, etc.] of the fundamental frequency.) Because the tongue, lips and jaw are in a different position for each vowel, the formant frequencies differ for each vowel. The frequencies of these formants account for the different vowel qualities you hear. The spectrogram also shows the pitch of the entire utterance (intonation contour) on the voicing bar marked 'P'. The striations, or thin vertical lines, indicate a single opening and closing of the vocal cords. When the striations are far apart, the vocal folds are vibrating slowly and the pitch is low; when the striations are close together, the vocal folds are vibrating rapidly and the pitch is high.

formant
In the frequency analysis of speech, a band of frequencies of higher intensity than surrounding frequencies, which appears as a dark line on a **spectrogram**. Individual vowels display different formant patterns.

Figure 8.1 **Waveform (upper panel) and spectrogram (lower panel) of the words heed, head, hard and horde spoken by a 21 year old male with a Mainstream Australian accent**

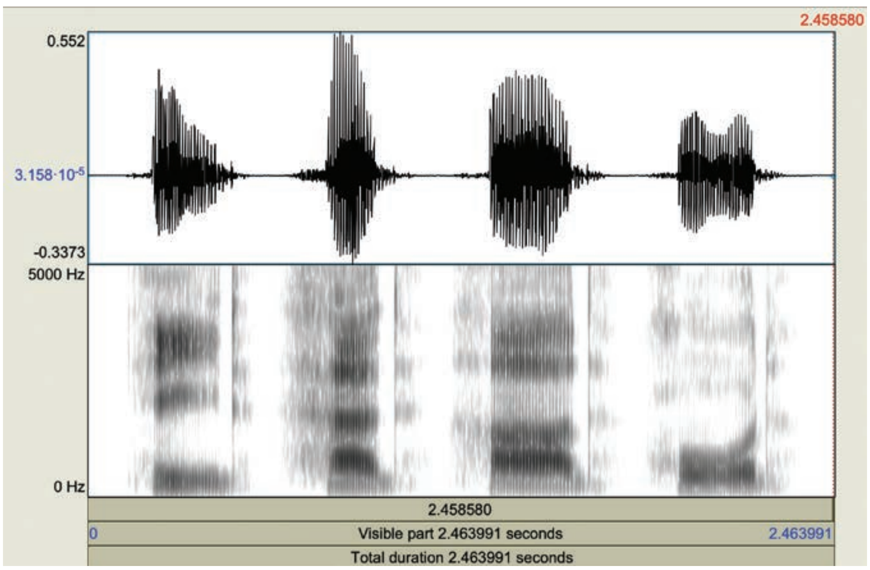


Photo by Felicity Cox

By studying spectrograms of many different speech sounds, we can learn a great deal about the basic acoustic components produced by the various shapes of the vocal tract.

Speech perception

> The mice think they are right, but my cat eats them anyways [sic] ... perception is everything.
>
> Terry Goodkind

Speech is a continuous signal. In natural speech, sounds overlap and influence each other, and yet listeners have the impression that they are hearing discrete units, such as words, syllables and phonemes. A central problem of speech perception is to explain how the listener carves up the continuous speech signal into meaningful units. This is referred to as the 'segmentation problem'.

Another challenge is to understand how listeners manage to recognise particular speech sounds when they occur in different contexts and when they are spoken by different people. How, for example, can a speaker tell that a [d] spoken by a man with a very deep voice is the same unit of sound as the [d] spoken in the high-pitched voice of a young child? Acoustically, they are very distinct. In addition, a [d] that occurs before the vowel [iː] is somewhat different acoustically from a [d] that occurs before the vowel [ʉː]. How does a listener know that two physically distinct instances of a sound are the same? This is referred to as the 'lack of invariance' problem.

Despite these problems, listeners are usually able to understand what they hear because our speech perception mechanisms are designed to overcome the variability and lack of discreteness in the speech signal. Experimental results show that listeners calibrate their perceptions to control for speaker differences and can quickly adapt to foreign-accented or distorted speech. When listening to distorted speech, for example, listeners need to hear only two to four sentences to adjust and can then generalise to words they have never heard before. It takes about a minute to adapt to non-native accents. Similarly, listeners adjust how they interpret timing information in the speech signal as a function of how quickly the speaker is talking. These *normalisation* procedures enable the listener to understand a [d] as a [d] regardless of the speaker or speech rate. Listeners can exploit various acoustic cues in the signal, as well as relationships among different acoustic elements, to get around the lack of invariance problem. For example, the frequency of the first or lowest formant for [ɐː] is high relative to [iː] and [ʉː], though the precise values may differ among speakers. Additionally, certain types of speech sounds have characteristic properties that can be relied upon for identification. Stops have a brief period of silence followed by a burst, fricatives produce high-frequency noise, and vowels are associated with particular formant structures. These acoustic cues help listeners identify phonological units in the signal regardless of the speaker.

As we might expect, the units we perceive depend on the language we know, especially its phonemic inventory. For example, the initial consonant in [diː], [dɐː], and [dʉː] are physically distinct from one another because of the formant transitions from the consonant to the different vowels – a coarticulation effect. Nevertheless, speakers perceive the [d]s as instances of the same phonological unit, namely the phoneme /d/. This phenomenon is known generally as **categorical perception** – speakers perceive physically distinct stimuli as belonging to the same category because their perceptions are assisted by knowledge of the underlying classificatory system. In the case of language, varying sounds are ascribed to phonemes based on a speaker's knowledge of the phonology of his language. Categorical perception is one of the mechanisms that the speech perception system uses to deal with variability in the signal.

categorical perception
The perception that allows speakers to distinguish sounds that differ along a continuum as belonging to the same phoneme in their language.

Similarly, speakers of English can perceive the difference between [l] and [ɹ] despite their acoustic similarity because these phones represent distinct phonemes in the language. Speakers of Japanese have great difficulty in differentiating the two because in that language they are allophones of one phoneme in Japanese. As we saw in our discussion of language development in Chapter 7, infants develop these different perceptual biases during the first year of life.

Returning to the segmentation problem, words and syntactic units, such as phrases and sentences, are seldom surrounded by boundaries such as pauses. Nevertheless, words are obviously units of perception. The spaces we put between them in writing support this view. How do we find the words and syntactic constituents in the speech stream?

lexical access
The process of searching the mental lexicon for a phonological string to determine if it is an actual word.

top-down processing
Expectation-driven analysis of linguistic input that begins with the assumption that a large syntactic unit, such as a sentence, is present and then analyses it into successively smaller constituents (phrases, words, **morphemes** etc.), which are ultimately compared with the sensory or acoustic data to validate the analysis. If the analysis is not validated, the procedure returns to the previously validated point, and then resumes.

bottom-up processing
Data-driven analysis of linguistic input that begins with the small units, such as phones, and proceeds step by step to increasingly larger units, such as words and phrases, until the entire input is processed, often ending in a complete sentence and semantic interpretation.

Stress and intonation provide some cues to these units. For example, in English 90 per cent of the words used in conversation begin with a stressed syllable. Experiments have shown that when English listeners hear a stressed syllable, they are likely to treat it as the onset of a new word. Stress and intonation can also cue syntactic constituents. We know that the different meanings of the sentences *He lives in the white house* and *He lives in the White House* can be signalled by differences in their stress patterns. It is also true that syllables at the end of a phrase are longer in duration than at the beginning, and intonation contours mark clause boundaries. In addition, listeners use their lexical knowledge to identify words in the signal. This process is called **lexical access**, or word recognition, discussed in detail later.

Bottom-up and top-down models

> I have experimented and experimented until now I know that [water] never does run uphill, except in the dark. I know it does in the dark, because the pool never goes dry; which it would, of course, if the water didn't come back in the night. It is best to prove things by experiment; then you know; whereas if you depend on guessing and supposing and conjecturing, you will never get educated.
>
> Mark Twain, *Eve's Diary*, 1906
>
> In this laboratory the only one who is always right is the cat.
>
> Motto in laboratory of physiologist Arturo Rosenblueth

Language comprehension is very fast and automatic. We understand an utterance as fast as we hear it or read it. Ordinarily, we can process spoken language at a rate of around twenty phonemes per second. A visually impaired person who relies on a sped-up synthetic voice to read written material can comprehend speech at rates near one hundred phonemes per second. To a sighted person, this rate of speech would sound like chipmunks chattering.

Successful language comprehension requires that a lot of operations take place at once (i.e. 'parallel processing') and includes segmenting the continuous speech signal into phonemes, morphemes, words and phrases; looking up the words and morphemes in the mental lexicon; finding the appropriate meanings of ambiguous words; parsing them into tree structures; choosing among different possible structures when syntactic ambiguities arise; interpreting the phrases and sentences; making a mental model of the discourse and updating it to reflect the meaning of the new sentence; and factoring in the pragmatic context to assist with the other tasks.

To account for this vast amount of mental computation, and owing to the sequential nature of language, psycholinguists believe that listeners make guesses as to what and what not to expect next, thus eliminating unneeded processing. They suggest that perception and comprehension must involve both **top-down processing** and **bottom-up processing**.

Bottom-up processing moves step by step from the incoming acoustic signal to semantic interpretation, building each part of the structure based on the sensory data alone. According to this model the speaker waits until she or he hears *the* and *boy*, and then constructs a noun phrase (NP), and then waits for the next word and so on.

In top-down processing, the listener relies on higher-level semantic, syntactic and contextual information to analyse the acoustic signal. On hearing the determiner *the*, for example, the speaker projects an NP and expects that the next word will be a noun, as in *the boy*. In this instance the listener's knowledge of phrase structure would be the source of information.

Psycholinguists try to determine the extent to which comprehension is based solely on the acoustic signal (bottom up) and how much help comes from contextual (sentence or discourse) information (top down). When the acoustic signal is inadequate to understand a word or phrase, top-down information can enable the hearer to choose from among a range of possibilities. Evidence for top-down processing is found in experiments that require subjects to identify spoken words in noisy conditions. Listeners make more errors when the words occur in isolation than when they occur in sentences. Moreover, they make more errors if the words occur in nonsense sentences, and they make the most errors if the words occur in ungrammatical sentences.

Another source of evidence for top-down processing comes from **shadowing tasks** in which subjects are asked to repeat what they hear as promptly as possible. Subjects often produce words in anticipation of the input. They can guess what is coming next by having processed the sentence to that point. Fast shadowers often correct speech errors or mispronunciations unconsciously and add inflectional endings if they are absent, showing rapid processing of the structural relations of immediately preceding words. Corrections are more likely to occur when the target word can be predicted from what has been said previously.

shadowing task
Task in which participants repeat an experimenter's speech as rapidly as they can.

Top-down processing is also supported by a different kind of experiment. Subjects hear recorded sentences in 'noisy conditions' in which some part of the signal is removed and a cough or buzz is substituted, such as the boldfaced 's' in the sentence *The state governors met with their respective legislature***s** *convening in the capital city*. They 'hear' the sentence without any phonemes missing, and have difficulty saying where in the word the noise occurred. This effect is called *phoneme restoration*. It appears that subjects can guess that the word containing the cough was *legislatures* and moreover, they truly believe they are hearing the [s] even when they are told it is not there. In this case, top-down information apparently overrides bottom-up information.

There is also a role for top-down information in segmentation. Sometimes an utterance can be divided in more than one way. For example, the phonetic sequence [gɹæɪdæɪ] in a discussion of meat or eggs is likely to be heard as *Grade A*, but in a discussion of the weather as *grey day*.

In other cases, both bottom-up and top-down information may bear on the ultimate decision of what was spoken. Consider the sequence of phonemes /nɑetɹæɪt/. It is compatible with two segmentations: [nɑe.tʰɹæɪt] with an aspirated [tʰ] meaning 'nitrate'; and [nɑet.ɹæɪt] with an unaspirated [t] meaning 'night rate'. Bottom-up information such as the phonetic details of pronunciation can signal where the word boundary is. If the first /t/ is heard as aspirated, it must belong to the onset of the second syllable, so the decision is *nitrate*. If it is unaspirated, it must be part of the coda of the first syllable, so the decision is *night rate*.

But top-down information may also weigh in, so that [nɑe.tʰɹæɪt] is favoured following the word *sodium* or in the context of chemistry whereas [nɑet.ɹæɪt] would be more plausible in the context of hotels. If the bottom-up cue is insufficient because of signal noise, or the top-down cue is vague because of an inconclusive context, then the other cue may weigh in more heavily in the final decision. None of this decision-making is conscious reasoning; it is all done for us by the grammatical engine that operates on the subconscious level.

Lexical access and word recognition

> Oh, are you from Wales?
> Do you know a fella named Jonah?
> He used to live in whales for a while.
>
> Groucho Marx (1890–1977)

Psycholinguists have conducted a great deal of research on lexical access or word recognition, the process by which we obtain information about the meaning and syntactic properties of a word from our mental lexicon. Several experimental techniques have been used in studies of lexical access.

Lexical decision tasks

One technique involves asking subjects to decide whether a string of letters (or sounds if auditory stimuli are used) is or is not a word. They must respond by pressing one button if the stimulus is an actual word and a different button if it is not, so they are making a **lexical decision**. During these and similar experiments, measurements of response times, or reaction times (often referred to as RTs), are taken. The assumption is that the longer it takes to respond to a particular task, the more processing is involved. RT measurements show that lexical access depends to some extent on word frequency, whereby more commonly used words (spoken and written), such as *car*, are responded to more quickly than words that we rarely encounter, such as *cad*.

lexical decision
Task in which participants must indicate by button press whether a written or spoken stimulus is a word or nonword.

Lexical decision tasks can also provide information about how we use our phonological knowledge in lexical access. Studies show that listeners respond more slowly to 'possible' non-words, such as *floop* and *plim*, than to 'impossible' non-words, such as *tlat* and *mrock*. The listener can quickly reject the impossible words based on phonotactic knowledge so that a lexical search is unnecessary. That possible and impossible non-words are processed differently is supported by brain imaging studies showing that the same areas of the brain are involved in accessing real words and possible non-words, while different areas respond to impossible non-words.

The speed with which a listener can retrieve a particular word also depends on the size of the word's phonological 'neighbourhood'. A neighbourhood is comprised of all the words that are phonologically similar to the target word. A word like *pat* has a dense neighbourhood because there are many similar words – *bat*, *pad*, *pot*, *pit*, and so on, while a word like *crib* has far fewer neighbours. Words with larger neighbourhoods take longer to retrieve than words from smaller ones because more phonological information is required to single out a word in a denser neighbourhood.

Psycholinguists believe that each word in the mental lexicon is associated with a 'resting level of activation', with some words more active than others. Each time the listener accesses a word its level rises a little bit. Thus, more frequently used words have a higher resting level of activation, and listeners show faster RTs to these words in decision tasks. Indeed, in reading tasks, subjects appear to 'skip over' the short, high-frequency function words, so quickly are they accessed. Top-down information may also play a role, allowing us quicker access to less frequent words when they are highly predictable from context.

semantic priming
The effect whereby the speed of recognition of a word (e.g. *doctor*) increases after exposure to a semantically similar word (e.g. *nurse*) compared with exposure to a semantically more distant word. The word *nurse* primes the word *doctor*.

Priming

Words can also be activated by hearing semantically related words. This effect is known as **semantic priming**. A listener will be faster at making a lexical decision on the word *doctor* if he has just heard *nurse* than if he just heard a semantically unrelated word such as *flower*. The word *nurse* is said to 'prime' the word *doctor*. When we hear a priming word, related words are 'awakened' and become more readily accessible for a few moments. This priming effect might arise because semantically related words are near each other or linked to each other in the mental lexicon. In bilinguals, a word may be primed in one language by a semantically related word in the other language. For example, in French–English bilinguals access to *cat* is facilitated by both *dog* and *chien*.

morphological priming
One kind of semantic priming in which one morpheme from a word consisting of several morphemes primes a word related in meaning.

Morphological priming is a kind of semantic priming in which a morpheme of a multimorphemic word primes a related word. For example, *sheepdog* primes *wool* as a result of *sheep*. Even when one morpheme is free and the other bound as in *runner*, the free morpheme *run* primes words like *race*. Stranger yet, even in pseudo-multimorphemic words, such as *summer*, which does not mean 'one who sums', the word 'sum' is primed much as *paint* is primed by the word *painter*. These examples suggest that morphological decomposition is taking place automatically based on the phonetics of the word irrespective of the semantics.

Lexical decision techniques can be evaluated alongside results from brain studies to provide a more detailed understanding of the process of lexical access. In some cases, electrical brain activity in experimental subjects indicates that lexical access is occurring even though RT measurements do not. For example, *teach* may prime the related *taught* according to brain activity but not according to RT measurements. This result suggests that lexical decision occurs in stages, and that RT measurements are insensitive to earlier stages, whereas the brain measurements are taken continuously and reflect both earlier and later stages. (We discuss brain studies in more detail later in this chapter.)

Lexical ambiguity

Lexical ambiguities also provide important insights into how listeners access the mental lexicon. In certain experimental tasks, RTs are longer with ambiguous words than unambiguous ones, suggesting that ambiguous words require more processing resources. Indeed, studies show that listeners retrieve all meanings of an ambiguous word even when the sentence containing the word is biased toward one of the meanings. For example, when the word *palm* is heard in *The gypsy read the young man's palm* it primes both the word *hand* and the word *tree* according to RT measurements. The other meaning of *palm* (as in *palm tree*) is apparently activated even though that meaning is not a part of the meaning of the priming sentence. At a subsequent stage of processing – after about 250 milliseconds – the listener makes a decision about which meaning is the intended one based on the information in the rest of the sentence. This suggests that the initial accessing of a word is strictly bottom-up – every lexical entry that matches the phonological representation is activated – while the subsequent selection of the contextually appropriate meaning is a top-down process. Interestingly, young children do not show priming of all meanings of an ambiguous word, but only the most frequently used meaning. This is most likely because children have more limited processing resources than adults.

Syntactic processing

> Teacher Strikes Idle Kids
> Enraged Cow Injures Farmer with Axe
> Killer Sentenced to Die for Second Time in 10 Years
> Stolen Painting Found by Tree
>
> Ambiguous newspaper headlines

The ability to comprehend what is said to us is a complex psychological process involving the internal grammar, parsing principles, linguistic context, and lexical information, such as the subcategorisation of verbs, prosody, frequency factors, and memory limitations. This section on syntactic processing discusses how some of these factors contribute to our sentence understanding or misunderstanding.

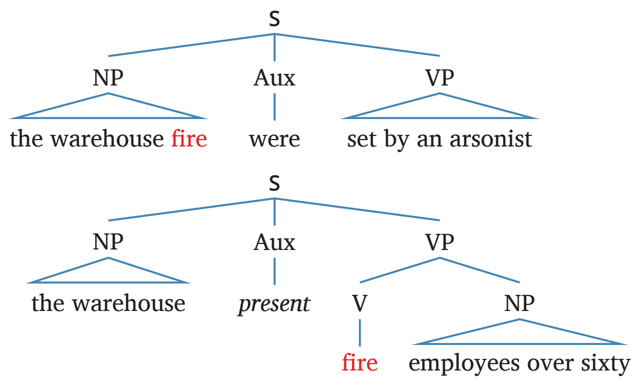
Understanding a sentence involves more than merely recognising its individual words. The listener must also engage the internal grammar and determine the syntactic relations among the words and phrases. This mental process, referred to as **parsing**, is largely governed by the rules of the grammar and strongly influenced by the sequential nature of language.

parsing
Process of analysing a sentence in spoken language or text into its constituents.

Listeners actively build a structural representation of a sentence as they hear it. They must therefore decide for each incoming word what its grammatical category is and how it fits into the structure that is being built. Often sentences present 'temporary ambiguities' that can cause us to misunderstand a sentence. We will discuss two kinds of cases; instances where a word is ambiguous between two syntactic categories and cases where the listener is attempted to attach a phrase in the wrong position in the sentence representation.

Syntactic category ambiguity

Misunderstandings of sentences can arise when a word belongs to more than one syntactic category. For example, the string *The warehouse fires …* could continue in one of two ways, with '*were set by an arsonist*' or '*employees over sixty*'. In other words, *fires* can be part of a NP *the warehouse fires* as in the first tree diagram that follows, or *fires* can be a verb as in the second continuation, as shown in the bottom tree diagram.



As has been noted, experimental studies of such sentences show that both meanings and categories are activated when the subject encounters the ambiguous word, similar to what was found in the priming experiments. The ambiguity is quickly resolved based on syntactic and semantic context, and on the frequency of the two uses of the word. Disambiguation is usually so fast and seamless that unintentionally ambiguous newspaper headlines, such as those at the head of this section, are scarcely noticeable except to linguists who collect them.

Garden path sentences

We have seen that ambiguities can arise when a word belongs to more than one syntactic category. Another important type of temporary ambiguity concerns sentences in which the phrase structure rules allow two possible attachments of a constituent, as illustrated by the following example:

After the child visited the doctor prescribed a course of injections.

When readers encounter the phrase *the doctor* they immediately perceive it as the direct object of the verb *visit*. When they later come to the verb *prescribed*, they must 'change their minds' or backtrack, and reanalyse *the doctor* as subject of a main clause instead. Sophisticated laboratory procedures that track the reader's eye movements can pinpoint difficult regions of the sentence and can see when the reader regresses to an earlier part of the sentence. Sentences that induce this effect are called **garden path sentences**.

garden path sentences
Sentences that appear at first blush to be **ungrammatical**, but with further syntactic processing turn out to be **grammatical**, e.g. *The horse raced past the barn fell.*

Probably the best-known garden path sentence in the literature is the following:

The horse raced past the barn fell.

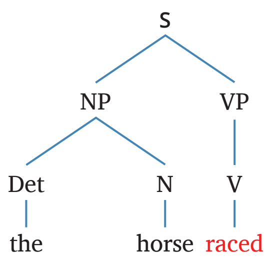
Almost everyone, on hearing this sentence, will judge it to be ungrammatical, yet will judge as grammatical a sentence with the same syntactic structure, such as:

The bus driven past the school stopped.

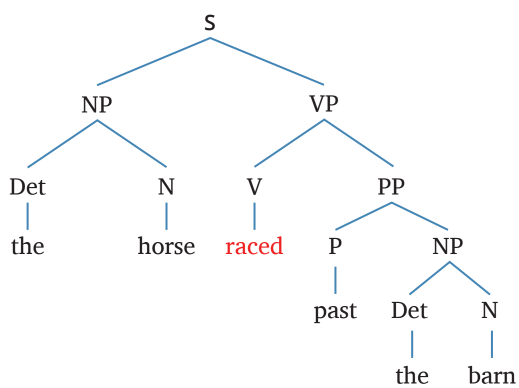
Similarly, many people will have no problem with the following sentence even though it has the same meaning as *The horse raced past the barn fell*:

The horse that was raced past the barn fell.

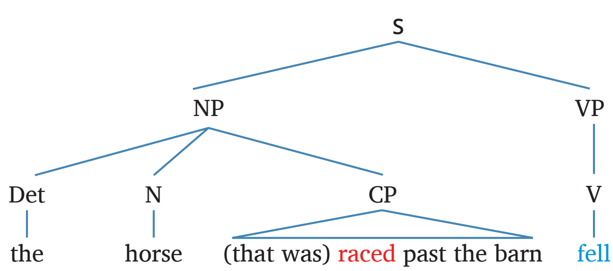
Let us consider why the sentence *The horse raced past the barn fell* is so confusing. As the listener hears each incoming word, they start to build a structure. After hearing the NP *the horse*, the listener hears *raced*, and attaches it to the structure in the verb phrase. (Here we ignore Aux for simplicity.)



Next, the listener hears *past*, followed by *the barn* and adds *past* as a preposition and *the barn* completes a prepositional phrase. So far so good.



But next, the listener hears *fell*. Where should this be attached? There is no obvious attachment site, so the listener needs to backtrack and reanalyse the structure so that *fell* can be incorporated into the sentence structure as the main verb.



In order to do this, *raced past the barn* has to be interpreted as a reduced relative clause modifying *horse*. The relative clause is 'reduced' because the initial *that was* is omitted. In this structure, *raced* is not a past tense form of the verb but must be analysed as the passive participle. It just so happens that the past tense form and the passive participle form for the verb *race* are the same in English. Notice that for the sentence *The bus driven past the school stopped* we do not garden path because the passive participle *driven* differs in form from the past tense form *drove*. This means that when listeners encounter *driven*, they are not tempted to attach it as the main verb in the sentence structure. Likewise, if we hear the full form of the relative clause *that was raced past the barn* with *that was* included in the sentence, the sentence structure is clear and we do not garden path.

The initial attachment choices that lead people astray may reflect general principles used by the parser to deal with syntactic ambiguity. Two such principles that have been suggested are known as **minimal attachment** and **late closure**. Minimal attachment says, 'Build the simplest structure consistent with the grammar of the language'. In the string *The horse raced …* the simpler structure is the one in which *the horse* is the subject and *raced* the main verb; the more complex structure is similar to *The horse that was raced …* We can think of simple versus complex here in terms of the amount of structure in the syntactic tree for the sentence so far.

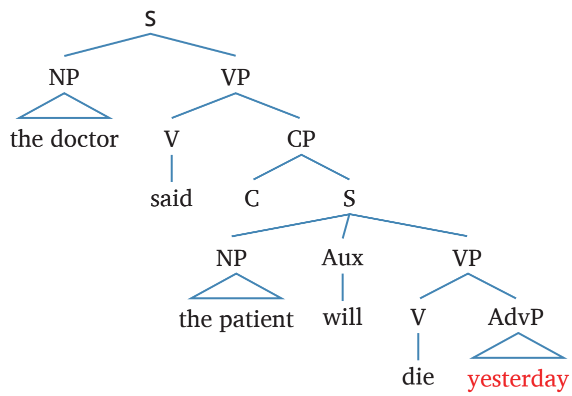
minimal attachment principle
The principle that, in comprehending language, listeners create the simplest structure consistent with the **grammar**, e.g. *The horse raced past the barn* is interpreted as a complete sentence rather than a noun phrase containing a relative clause, as if it were *the horse* (that was) *raced past the barn*.

late closure principle
The principle that, in comprehending language, listeners attach incoming material to the phrase that was most recently processed, e.g. *He said that he slept yesterday* associates *yesterday* with *he slept* rather than with *he said*.

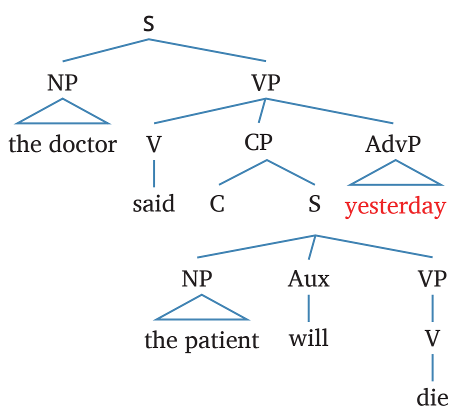
The second principle, late closure, says, 'Attach incoming material to the phrase that is currently being processed'. Late closure is exemplified in the following sentence:

The doctor said the patient will die yesterday.

Readers often experience a garden path effect at the end of this sentence because their initial inclination is to construe *yesterday* as modifying *will die*, as in the phrase structure tree below. But this attachment results in a sentence that is semantically incongruous. (Aux is omitted in the main clause for simplicity.)



Late closure explains this: the hearer encounters *yesterday* as he or she is processing the embedded clause, of which *die* is the main verb. On the other hand, the verb *said*, which *yesterday* is supposed to modify, is part of the main clause, which has not been worked on for the past several words. The hearer must therefore backtrack to attach *yesterday* to the clause containing *said*. The adverb phrase is attached as sister to the verb. This is illustrated in the tree diagram below.



The syntactic parsing of sentences depends on different sources of information. The parser depends on the grammar to inform it as to how the incoming words can be grouped together into well-formed constituents. In cases of ambiguity, there are various structural possibilities to choose from. Principles such as minimal attachment and late closure guide the parser to choose the computationally simplest structure among the different grammatical possibilities. Garden path effects arise when listeners make a strong commitment to the simpler structure and are then forced to adjust due to some kind of incongruity.

In some cases, frequency factors cause the reader to garden path, as illustrated by the following sentence:

The faithful people our church every Sunday.

People is open to ambiguity in its syntactic category, but it occurs much more frequently as a noun than a verb. This leads the reader to initially analyse *the faithful people* as an NP, but this does not fit well with the following words, which lack a verb. The reader must backtrack and reanalyse *people* as the main verb meaning 'to populate'.

Other factors, such as prosody, lexical biases and even visual context, can influence the parser in structural choices, and may even weaken the effects of the parsing principles. For example, the following sentence is ambiguous: either the actress or the maid can be understood as the one on the balcony:

Someone photographed the maid of the actress who was on the balcony.

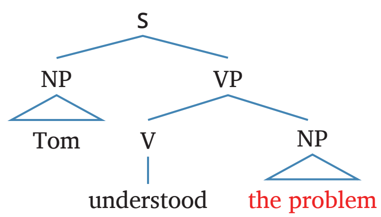
Late closure would make the actress on the balcony the preferred interpretation. Studies show that placing an intonation pause after the maid greatly increases the chances of the listener assigning this meaning. On the other hand, a pause after *the actress* increases the likelihood of the interpretation where the maid is on the balcony.

Studies of other languages may call into question the universality of late closure. Given the Spanish equivalent of the *actress–maid* type sentences, Spanish listeners prefer the interpretation in which the maid is on the balcony. Spanish speakers still obey late closure with other constructions, however.

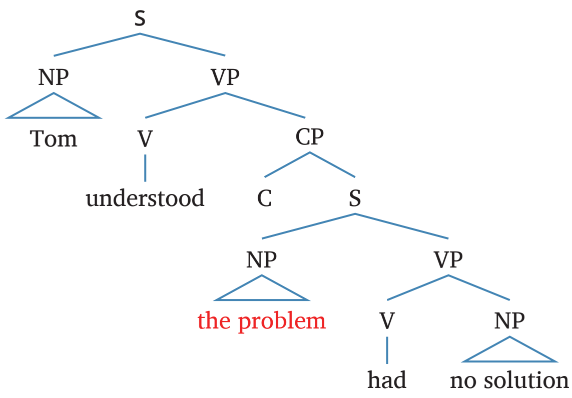
Further factors

In the previous sections we discussed how temporary ambiguity can be introduced when a word belongs to more than one syntactic category or when a phrase can be attached in the phrase structure tree in two potential positions. Other factors, such as the type of verb and its subcategorisation, the listener's knowledge of the world, and memory capacity, can also contribute to whether or not a listener temporarily misunderstands a sentence. Let us consider these in turn.

The subcategorisation options of a particular verb may influence the parser's structural decisions. In the first sentence below the processor is led to parse *the problem* as the direct object of the verb *understood* (minimal attachment):



However, when the listener encounters *had no solution*, they are forced to backtrack and attach *the problem* as the subject NP in the embedded clause, as illustrated below:



The listener is much less likely to garden path if they hear a sentence with the verb *think* instead of *understand*, such as *Tom thought the problem had no solution*. This is because the verb *understand* can be followed by both an NP and a sentence (*Tom understood the story*, *Tom understood the story was false*), while the verb *think* can be followed by a sentence but not an NP. (*Tom thinks the story is crazy, *Tom thinks the story*). This means misunderstanding is less likely to occur. The (mental) sentence processor is sensitive to both subcategorisation information in the lexical entries of verbs and also the frequency of occurrence of different contexts for particular verbs.

Surprisingly, the parser does not seem to make use of non-linguistic information, such as what is plausible in the real world to make decisions about which structure to assign. Let us use the following example:

The performer sent the flowers was very pleased.
The florist sent the flowers was very pleased.

You might think that a garden path is less likely in the first sentence with *the performer* as the subject NP than the second sentence in which *the florist* is the subject NP because real-world knowledge tells us that performers are routinely sent flowers and florists routinely send them. But this is not the case. Eye-tracking studies have shown that readers garden path equally on these two sentences despite the difference in plausibility. However, in a different task, when readers are asked to paraphrase the two sentences and say what they mean, they do better with the more plausible *performer sent the flowers* sentence, indicating that non-linguistic context facilitates comprehension at some point, though not at the parsing stage. Sentences that create problems for the parser, such as garden path sentences, tell us a great deal about how the sentence processor operates.

Finally, memory also comes into play in sentence understanding. Another striking example of processing difficulty can be observed when a Mother Goose poem is reworded. In its original form we have:

This is the dog that worried the cat that killed the rat that ate the malt that lay in the house that Jack built.

No problem understanding that? Now try this equivalent description:

Jack built the house that the malt that the rat that the cat that the dog worried killed ate lay in.

No way, right? Although the confusing sentence follows the rules of relative clause formation – you have little difficulty with *the cat that the dog worried* – it seems that once is enough and when you apply the same process twice, getting *the rat that the cat that the dog worried killed*, it becomes quite difficult to process. If we apply the process three times, as in *the malt that the rat that the cat that the dog worried killed ate*, all hope is lost.

The difficulty in parsing this kind of sentence is related to memory constraints. In processing the sentence, you have to keep *the malt* in mind all the way until *ate*, but while doing that you have to keep *the rat* in mind all the way until *killed*, and while doing that … It is a form of structure juggling that is difficult to perform; we evidently do not have enough memory capacity to keep track of all the necessary items. Though we have the competence to create such sentences, performance limitations prevent the creation and comprehension of such monstrosities.

Speech production

> Speech was given to the ordinary sort of men whereby to communicate their mind; but to wise men, whereby to conceal it.
>
> Robert South, *Sermon*, Westminster Abbey, 30 April 1676

As we saw in the previous sections, the listener's job is to decode the intended meaning of a message from the speech signal produced by a speaker. The speaker's job is the reverse. He or she must encode an idea into an utterance using speech sounds and words (or signs) organised according to the grammatical structures of the language. It is more difficult to devise experiments that provide information about how the speaker proceeds than to do so for the listener's side of the process. Much of the best information about speech production has come from observing and analysing spontaneous speech, especially speech errors.

Lexical selection

> Humpty Dumpty's theory, of two meanings packed into one word like a portmanteau, seems to me the right explanation for all. For instance, take the two words 'fuming' and 'furious'. Make up your mind that you will say both words but leave it unsettled which you will say first. Now open your mouth and speak. If … you have that rarest of gifts, a perfectly balanced mind, you will say 'frumious'.
>
> Lewis Carroll, Preface to *The Hunting of the Snark*, 1876

In our previous discussion of comprehension, we saw that semantically related words are activated or primed during lexical retrieval. In production, we see a similar effect with slips of the tongue or speech errors, especially word substitution errors. Word substitutions are seldom random; they show that in our attempt to express our thoughts, we may make an incorrect lexical selection based on partial similarity or relatedness of meanings. This is illustrated in the following examples:

Bring me a pen.	→	Bring me a pencil.
It stays light out late here	→	It stays dark out late here.
Please set the table.	→	Please set the chair.
Are my tyres touching the curb?	→	Are my legs touching the curb?

Blends, in which we produce part of one word and part of another, further illustrate the lexical selection process in speech production; we may select two or more words to express our thoughts and instead of deciding between them, produce them as 'portmanteaus', as Humpty Dumpty calls them. Such blends are illustrated in the following errors:

blend
A word composed of the parts of more than one word, e.g. *smog* from *smoke* + *fog*.

splinters/blisters	⟶	splisters
edited/annotated	⟶	editated
a swinging/hip chick	⟶	a swip chick
frown/scowl	⟶	frowl

These blend errors are typical in that the segments stay in the same position within the syllable as they did in the target words. This is not true in the example made up by Lewis Carroll – a much more likely blend of *fuming* and *furious* would be *fumious* or *furing*.

In comprehension, lexical retrieval is affected by the number of words that are phonologically related to the target – what we earlier referred to as 'phonological neighbourhoods.' In production, speakers often make speech errors involving the substitution of a word that is phonologically related to the target but unrelated in meaning, as the following examples show:

Did you feed the bunny?	⟶	Did you feed the banana?
We need a few laughs to break up the monotony.	⟶	We need a few laughs to break up the mahogany.
The flood damage was so bad they had to evacuate the city.	⟶	The flood damage was so bad they had to evaporate the city.

Just as more common words are accessed faster in comprehension than less common, so are they retrieved more easily in production. Speakers come up with *knife* more quickly than *bayonet*, for example. This is shown in studies of speaker hesitations or pauses, which are more common before low frequency words.

It is not surprising that many of the same factors that influence the listener in comprehension also affect the speaker in production – semantic and phonological relatedness of words, and word frequency. Whether you are speaking or listening you are accessing the same mental lexicon.

Application and misapplication of rules

> I thought ... four rules would be enough, provided that I made a firm and constant resolution not to fail even once in the observance of them.
>
> René Descartes, *Discourse on Method*, 1637

Spontaneous errors show that the rules of morphology and syntax, discussed in earlier chapters as part of our linguistic competence, may also be applied (or misapplied) when we speak. It is hard to see this process in normal error-free speech, but when someone says 'groupment' instead of 'grouping', 'ambigual' instead of 'ambiguous' or 'bloodent' instead of 'bloody', it shows that regular rules are applied to morphemes to form possible but non-existent words.

Inflectional rules also surface. The professor who said '*We swimmed in the pool' knows that the past tense of *swim* is *swam* but mistakenly applied the regular rule to an irregular form.

Morphophonemic rules also appear to be performance rules as well as rules of competence. Consider the *a/an* alternation rule in English. Errors such as *an istem* for the intended *a system* or *a burly bird* for the intended *an early bird* show that when segmental disordering changes a noun beginning with a consonant to a noun beginning with a vowel or vice versa, the indefinite article is also changed so that it conforms to the grammatical rule.

Speakers hardly ever produce errors such as **an burly bird* or **a istem*, which tells us something about the stages in the production of an utterance. The rule that determines whether *a* or *an* should be produced must apply after the stage at which *early* has slipped to *burly*; that is, the stage at which /b/ has been anticipated. If *a/an* were selected first, the article would be *an* (or else the rule must reapply after the initial error has occurred). Similarly, an error such as *bin beg* for the intended *Big Ben* shows that phonemes are disordered before allophonic rules apply; that is, the intended *Big Ben* phonetically is [bɪg bẽn] with an oral [ɪ] before the [g] and a nasal [ẽ] before the [n]. In the utterance that was produced, the [ɪ] is nasalised to [ɪ̃] because it now occurs before the disordered [n], whereas the [e] is oral before the disordered [g]. If the disordering occurred after the phonemes had been replaced by phonetic allophones, the result would have been the phonetic utterance [bɪn bẽg].

Planning units

We might suppose that speakers' thoughts are simply translated into words one after the other via a semantic mapping process. Grammatical morphemes would be added as demanded by the syntactic rules of the language. The phonetic representation of each word in turn would then be mapped onto the neuromuscular commands to the articulators to produce the acoustic signal representing it.

We know, however, that this is not a true picture of speech production. Although sounds within words and words within sentences are linearly ordered, speech errors or slips of the tongue show that the prearticulation or planning stages involve units larger than the single phonemic segment. Examples known as **spoonerisms** illustrate this. Spoonerisms are named after William Archibald Spooner, a distinguished dean of an Oxford college in the early 1900s who is reported to have referred to Queen Victoria as 'That queer old dean' instead of 'That dear old queen', and berated his class of students by saying, 'You have hissed my mystery lecture. You have tasted the whole worm', instead of the intended 'You have missed my history lecture. You have wasted the whole term'.

spoonerism
A speech error in which consonants, vowels or morphemes are switched between words.

Indeed, speech errors show that features, segments, words and phrases may be conceptualised well before they are uttered. This point is illustrated in the examples of speech errors in **Figure 8.2**.

Figure 8.2 Speech errors

	Intended utterance	Actual utterance	Explanation of error
1	The ***h***iring of minority faculty	The ***f***iring of minority faculty	The intended *h* is replaced by the *f* of *faculty*, which occurs later in the intended utterance
2	***a***d h***o***c	***o***dd h***a***ck	The vowels /æ/ of the first word and /a/ of the second are exchanged or reversed
3	***b***ig and ***f***at	***p***ig and ***v***at	The values of a single feature are switched: in *big* [+voiced] becomes [–voiced] and in *fat* [–voiced] becomes [+voiced]
4	There are many ministers in our church	There are many ***churches*** in our ***minister***	The root morphemes *minister* and *church* are exchanged; the grammatical plural morpheme remains in its intended place in the phrase structure
5	Seymour sliced the salami with a knife	Seymour sliced ***a knife*** with ***the salami***	The entire noun phrases (article + noun) were exchanged

In these errors, the intonation contour (primary stressed syllables and variations in pitch) remained the same as in the intended utterances, even when the words were rearranged. In the intended utterance of (5), the highest pitch would be on *knife*. In the misordered sentence, the highest pitch occurred on the second syllable of *salami*. The pitch rise and increased loudness do not therefore depend on the individual words but are determined by the syntactic structure of the sentence.

These errors show us that syntactic structures exist independently of the words that occupy them, and intonation contours can be mapped onto those structures without being associated with particular words.

Errors like those just cited are constrained in interesting ways. Phonological errors involving segments or features, as in (1), (2), and (3), primarily occur in content words, and not in grammatical morphemes, showing the distinction between these lexical classes. In addition, free morphemes may be inter-changed but bound morphemes may not be. We do not find errors like *The boying are sings* for *The boys are singing*. Typically, as example (4) illustrates, the affixes are left behind when root morphemes switch, and then attach to the moved morpheme. Errors like those in **Figure 8.2** show that speech production operates in real time using the features, segments, morphemes, words, and phrases that exist in the grammar. They also show that when we speak, words are chosen and sequenced ahead of when they are articulated.

Planning also goes on at the sentence level. In experimentally controlled settings, speakers take longer to initiate (begin uttering) passive sentences like *The ball was chased by Nellie* than active sentences like *Nellie chased the ball*. They also take longer to begin uttering sentences containing relative clauses like *The cat that the dog chased climbed the tree* than ones like *The cat that scratched the dog climbed the tree* due to the word order in the relative clause. These findings suggest that more planning goes into sentences that have a less common word order than into sentences with SVO word order, as outlined in the worked examples below.

Worked example — Planning in Active versus Passive Sentences

Nellie chased ***the ball***	**Active** The object of 'chase' is 'the ball.'
The ball was chased by Nellie	**Passive** The object of the active sentence 'the ball' becomes the subject NP in the passive sentence.

Worked example — Sentences containing Relative Clauses

[***The cat*** [that __scratched the dog] climbed the tree. S S V O	The relative clause modifies 'the cat', which is the head noun. 'The cat' is the agent of 'scratch' and it is moved by a transformation from the position marked with '__'.
[***The cat*** [that the dog chased__] climbed the tree. O S V O	The relative clause modifies 'the cat', the head noun. 'The cat' is the patient of the verb 'chase,' and it is moved by a transformation from the object position inside the relative clause marked '__'.

Interestingly, however, speakers are more likely to produce a passive sentence after hearing a passive, despite its non-typical word order. In syntactic priming experiments, speakers are asked to describe a scene after hearing an unrelated active or passive sentence. Results show that they are more likely to describe the scene using a passive if that is what they have just heard.

Researchers believe that once a particular structure has been built, it remains 'active' in memory and facilitates the subsequent building of a similar structure.

Speakers must also combine simple sentences into complex structures containing embedded clauses, relative clauses, and so on. Studies of speakers' hesitations show that planning for complex structures happens at the beginning of clauses. For example, the **initiation time** is shorter for producing a simple NP subject such as *the large and raging river* than for a subject NP that contains a relative clause, such as *the river that stopped flooding*. This is the case even though both NPs are the same length in the sense that they have the same number of syllables.

initiation time
The amount of planning time taken before a speaker utters a given structure.

Pauses occur more often at the beginning of clauses than within them, and speech errors involving exchanges of linguistic units, such as those in (4) and (5) in **Figure 8.2**, happen within clauses and not across clause boundaries. These findings among others support the hypothesis that the clause boundary is the locus of planning in complex sentences, and that sentences are bundled into clause-size units before they are produced.

The comprehension and production of language is an enormously complex process that depends on many aspects of our linguistic knowledge, as well as dedicated processing principles and other cognitive capacities, such as memory. Both normal conversational data and experimental data provide the psycholinguist with information about the different units, mechanisms, and stages speakers use to encode an idea into speech and listeners use to decode the speech signal into a linguistic message.

In the next section we turn to neurolinguistics and investigate the relationship between the brain and language. Philosophers and scientists have grappled with this issue for centuries. But modern advances in brain technology have enabled researchers to study the brain-language connection in ways scarcely imagined in earlier times. We begin by reviewing the architecture of the human brain.

The human brain: localisation of language

> The human brain is unique in that it is the only container of which it can be said that the more you put into it, the more it will hold.
>
> Glenn Doman

The brain is the most complex organ of the body. The surface of the brain is the **cortex**, often called 'grey matter', consisting of 100 billion neurons (nerve cells) and even more glial cells (which support and protect the neurons and have as yet unknown other functions). The cortex is the decision-making organ of the body. It receives messages from all of the sensory organs, initiates all voluntary and involuntary actions, and is the storehouse of our memories and the seat of our consciousness. It is the organ that most distinguishes humans from other animals. It is where human language resides.

The brain is composed of **cerebral hemispheres**, one on the right and one on the left, joined by the **corpus callosum**, a network of more than 200 million fibres (see **Figure 8.3**). The corpus callosum allows the two hemispheres of the brain to communicate with each other. Without this system of connections, the two hemispheres would operate independently. In general, the left hemisphere controls the right side of the body, and the right hemisphere controls the left side. If you point with your right hand, the left hemisphere is responsible for your action. Similarly, sensory information from the right side of the body (e.g. right ear, right hand, right visual field) is received by the left hemisphere of the brain, and sensory input to the left side of the body is received by the right hemisphere. This is referred to as **contralateral** brain function.

Our next question is to determine which areas of the brain are responsible for human linguistic abilities.

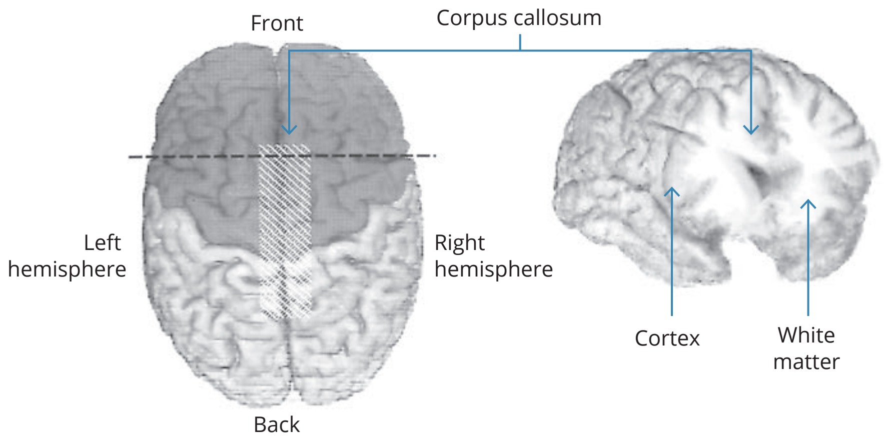
cortex
The approximately 10 billion neurons that form the outside layer of the brain; also referred to as 'grey matter'.

cerebral hemispheres
The left and right halves of the brain, which are joined by the **corpus callosum**.

corpus callosum
The nerve fibres connecting the right and left **cerebral hemispheres**.

contralateral
Refers to the transmission of sensory information from one side of the body (left/right) to the opposite **cerebral hemisphere** (right/left)

Figure 8.3 **Three-dimensional reconstruction of the normal living human brain. The images were obtained from magnetic resonance data using the brain-vox technique. Left: view from the top. Right: view from the front following virtual coronal section at the level of the dashed line**



Courtesy of Hanna Damasio

localisation
The hypothesis that different areas of the brain are responsible for distinct cognitive systems; see **lateralisation**.

phrenology
A pseudoscience, the practice of which is determining personality traits and intellectual ability by examination of the bumps on the skull. Its contribution to **neurolinguistics** is that its methods were highly suggestive of the modular theory of brain structure.

In the early nineteenth century, Franz Joseph Gall proposed the theory of **localisation**, which is the idea that different human cognitive abilities and behaviours are localised in specific parts of the brain. In light of our current knowledge about the brain, some of Gall's particular views are amusing. He proposed, for example, that language is located in the frontal lobes of the brain because as a young man he had noticed that the most articulate and intelligent of his fellow students had protruding eyes, which he believed reflected overdeveloped brain material. He also put forth a pseudoscientific theory called 'organology' that later came to be known as **phrenology**, which is the practice of determining personality traits, intellectual capacities and other matters by examining the bumps on the skull. This idea that specific abilities are localised to different parts of the brain is highlighted in the Peanuts cartoon in Figure 8.4.

Figure 8.4 **Specific abilities**

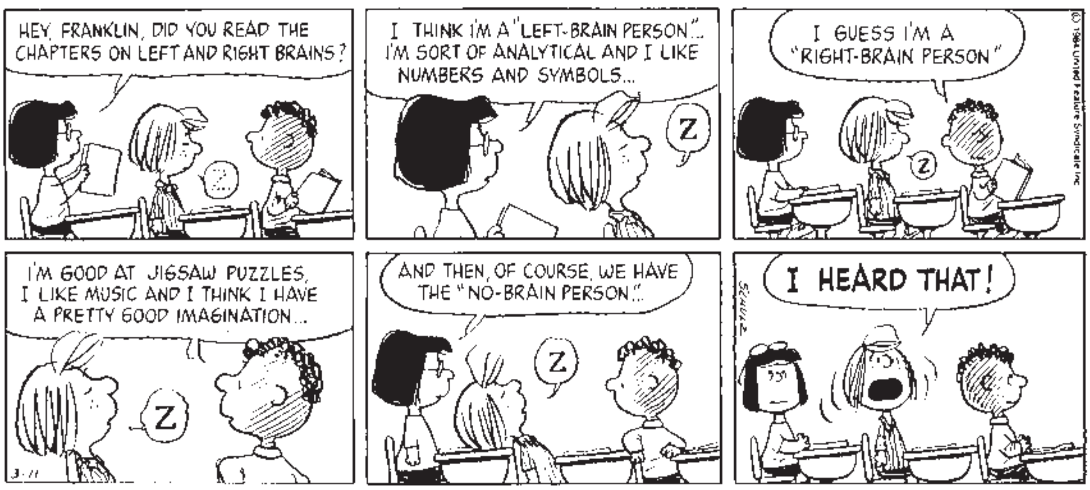


Figure 8.5 **Phrenology skull model**

Johann Spurzheim, *People's Cyclopedia of Universal Knowledge* (1883).

A disciple of Gall's, Johann Spurzheim, introduced phrenology to America. He constructed elaborate maps and skull models, such as the one shown in Figure 8.5, in which language is located directly under the eye.

Gall, in arguing against the prevailing view that the brain was an unstructured organ, was a pioneer and a courageous scientist. Although phrenology was long ago discarded as a scientific theory, Gall's view that the brain is not a uniform mass, and that linguistic and other cognitive capacities are functions of localised brain areas, has been upheld by scientific investigation of aphasia and other disorders and, more recently, by functional brain imaging.

Aphasia

The study of **acquired aphasia** has been an important area of research in understanding the relationship between brain and language. 'Aphasia' is the neurological term for any language disorder that results from brain damage caused by disease or trauma.

In the second half of the nineteenth century, significant scientific advances were made in localising language in the brain based on the study of people with aphasia. In 1864 the French surgeon Paul Broca proposed that language is localised to the left hemisphere of the brain and, more specifically, to the front part of the left hemisphere (now called **Broca's area**). At a scientific meeting in Paris, he claimed that we speak by using the left hemisphere. Broca's finding was based on a study of his patients who suffered language deficits after brain injury to the left frontal lobe.

A decade later Carl Wernicke, a German neurologist, described another variety of aphasia that occurred in patients with lesions in areas of the left hemisphere temporal lobe, now known as **Wernicke's area**. Language, then, is lateralised to the left hemisphere, and the left hemisphere appears to be the language hemisphere from infancy on. **Lateralisation** is the term used to refer to the localisation of function to one hemisphere of the brain. Figure 8.6 is a view of the left side of the brain that shows Broca's and Wernicke's areas.

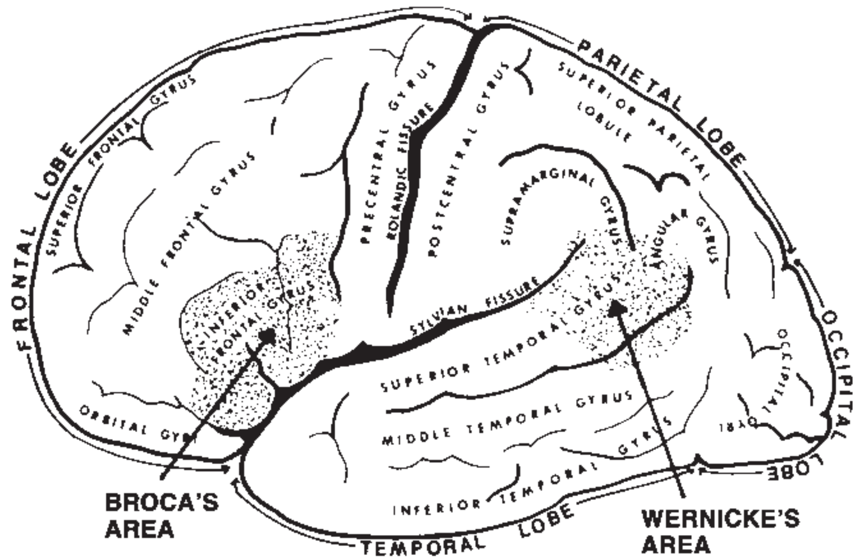
acquired aphasia
Language loss or disorders following brain damage.

Broca's area
A front (anterior) part of the left hemisphere of the brain, damage to which causes agrammatism or **Broca's aphasia**; also called Broca's region.

Wernicke's area
A back (posterior) part of the left hemisphere of the brain, which if damaged causes **Wernicke's aphasia**; also called Wernicke's region.

lateralisation; lateralised
Refers to cognitive functions localised to one or the other side of the brain.

Figure 8.6 **Lateral (external) view of the left hemisphere of the human brain, showing the position of Broca's and Wernicke's areas, two key areas of the cortex related to language processing**



Paul Broca

Many aphasics do not show total language loss. Rather, different aspects of language are selectively impaired, and the kind of impairment is generally related to the location of the brain damage. Because of this damage–deficit correlation, research on patients with aphasia has provided a great deal of information about how language is organised in the brain.

Broca's aphasia

Broca's aphasia (agrammatism) A language disorder usually resulting from damage to Broca's region in which the patient has difficulty with certain aspects of syntax, especially functional categories; also called **agrammatism**.

Patients with injuries to Broca's area may have **Broca's aphasia** (also called **agrammatism**). Broca's aphasia is characterised by laboured speech and certain kinds of word-finding difficulties, but it is primarily a disorder that affects the person's ability to form sentences using the rules of syntax. One of the most notable characteristics of Broca's aphasia is that the language is often agrammatic, meaning that it frequently lacks articles, prepositions, pronouns, auxiliary verbs and other function words. Broca's aphasics also typically omit inflections such as the past tense suffix *-ed* or the third-person singular verb ending *-s*. Here is an excerpt of a conversation between a patient with Broca's aphasia and a doctor:

Doctor:	Could you tell me what you have been doing in the hospital?
Patient:	Yes, sure. Me go, er, uh, P.T. [physical therapy] none o'cot, speech … two times … read … r … ripe … rike … uh write … practice … get … ting … better.
Doctor:	And have you been going home on weekends?
Patient:	Why, yes … Thursday uh … uh … uh … no … Friday … Bar … ba … ra … wife … and oh car … drive … purpike … you know … rest … and TV.

Broca's aphasics (also called agrammatic aphasics) may also have difficulty understanding complex sentences that have non-canonical word order due to the fact that movement rules have applied. For example, agrammatic aphasics do better at understanding *wh*-questions that question the subject position than ones that question the object position. This is because a subject *wh*-question adheres to the canonical word order for English which is Subject Verb Object whereas an object *wh*-question does not. The '_' in the examples below shows the original position of the *wh*-phrase *which girl*:

Which girl _ kissed the boy?	Subject *wh*-question
Which girl did the boy kiss _?	Object *wh*-question

Aphasics might also be confused as to who is chasing whom in passive sentences. Consider the following example:

The cat was chased by the dog

In this passive sentence, the agent of the action is the dog, and in English, agents are often in the subject position. In passives, however, the agent of the action is in the by-phrase (*by the dog*) and the chased animal, *the cat*, shows up in the subject position. In addition, the fact that it is plausible for either the cat or the dog to be the chaser adds to the difficulty of such passive sentences.

Aphasics will have less difficulty with sentences such as:

Which book did the boy read_?

or

The car was chased by the dog.

This is because the meaning can be determined by what the person knows about the world. It is implausible for books to read boys or for cars to chase dogs, and aphasic people can use that knowledge to interpret the sentence.

Wernicke's aphasia

Unlike Broca's patients, people with **Wernicke's aphasia** produce fluent speech with good intonation, and they may largely adhere to the rules of syntax. However, their language is often semantically incoherent. One patient replied to a question about his health with:

I felt worse because I can no longer keep in mind from the mind of the minds to keep me from mind and up to the ear which can be to find among ourselves.

Another patient described a fork as 'a need for a schedule' and another, when asked about his poor vision, replied, 'My wires don't hire right'.

People with damage to Wernicke's area have difficulty in naming objects presented to them and also in choosing words in spontaneous speech. They may make numerous lexical errors (word substitutions), often producing **jargon** and **nonsense words**, as in the following example:

The only thing that I can say again is madder or modder fish sudden fishing sewed into the accident to miss in the purdles.

Another example is from a patient who was a physician before his aphasia. When asked if he was a doctor, he replied:

Me? Yes sir. I'm a male demaploze on my own. I still know my tubaboys what for I have that's gone hell and some of them go.

Severe Wernicke's aphasia is often referred to as **jargon aphasia**. The linguistic deficits exhibited by people with Broca's and Wernicke's aphasia point to a modular organisation of language in the brain. Damage to different parts of the brain results in different kinds of linguistic impairment (e.g. syntactic versus semantic). This supports the hypothesis that the mental grammar, like the brain itself, is not an undifferentiated system, but rather consists of distinct components or modules. This is often referred to as the **modularity** of the mind.

The kind of word substitutions that aphasic patients produce also tell us about how words are organised in the mental lexicon. Sometimes the substituted words are similar to the intended words in their sounds. *Pool*, for example, might be substituted for *tool*, *sable* for *table* or *crucial* for

Wernicke's aphasia
The type of aphasia resulting from damage to Wernicke's area in which the patient often produces semantically incoherent language.

jargon
Special words peculiar to the members of a profession or group, e.g. *airstream mechanism* for phoneticians.

nonsense word
A permissible phonological form without meaning, e.g. *slithy*.

jargon aphasia
A form of **aphasia** in which **phonemes** are substituted, resulting in **nonsense words**; often produced by people who have **Wernicke's aphasia**.

modularity
The organisation of the brain and mind into distinct, independent and autonomous parts that interact with each other.

crucible. Sometimes they are related in meaning (e.g. *table* for *chair* or *boy* for *girl*). These errors resemble the speech errors that anyone might make, but they occur far more frequently in people with aphasia. The substitution of semantically or phonetically related words tells us that neural connections exist among semantically related words and among words that sound alike. Words are not mentally represented in a simple list but rather in an organised network of connections, comprising lexical neighbourhoods.

Most of us have experienced word-finding difficulties when speaking if not when reading, as Alice did in Wonderland when she said:

> 'And now, who am I? I will remember, if I can. I'm determined to do it!' But being determined didn't help her much, and all she could say, after a great deal of puzzling, was 'L, I know it begins with L.'
>
> Lewis Carroll, *Alice's Adventures in Wonderland*, 1865

tip-of-the-tongue (TOT) phenomenon
The difficulty encountered from time to time in retrieving a particular word or expression from the mental **lexicon**. Anomic aphasics suffer from an extreme form of this problem.

anomia; anomic aphasia
A form of **aphasia** in which patients have word-finding difficulties.

This **tip-of-the-tongue phenomenon** (often referred to as **TOT**) is not uncommon. But if you could rarely find the word you wanted, imagine how frustrated you would feel. This is the fate of many aphasics whose impairment involves severe **anomia** – the inability to find the word you wish to speak.

Aphasia in deaf signers

Deaf signers with damage to the left hemisphere show aphasia for sign language similar to the language breakdown in hearing aphasics, even though sign language is a visual–spatial language, and the right hemisphere is the one specialised for most aspects of visual and spatial cognition. Moreover, in tests measuring hemispheric activation (some of which we discuss in the following), one finds that it is the *auditory* cortex in the left hemisphere of deaf individuals attempting to process signs that is activated, the very area we might expect to be the *least* responsive to language in the deaf.

Deaf patients with lesions in Broca's area show language deficits like those found in hearing patients, namely, severely dysfluent, agrammatic sign production. Likewise, those with damage to Wernicke's area have fluent but often semantically incoherent sign language, filled with made-up signs. Although deaf aphasic patients show marked sign language deficits, they have no difficulty producing non-linguistic gestures or sequences of non-linguistic gestures, even though both non-linguistic gestures and linguistic signs are produced by the same 'articulators' – the hands and arms. Deaf aphasics also have no difficulty in processing non-linguistic visual–spatial relationships, just as hearing aphasics have no problem with processing non-linguistic auditory stimuli. These findings are important because they show that the left hemisphere is lateralised for language – an abstract system of symbols and rules – and not simply for hearing or speech. Language can be realised in different modalities, spoken or signed, but is lateralised to the left hemisphere regardless of modality.

The language difficulties suffered by aphasics are not caused by any general cognitive or intellectual impairment or loss of motor or sensory control of the speech organs or hearing apparatus. Aphasics can produce and hear sounds and their other cognitive abilities may be intact. Whatever loss they suffer has to do only with the language faculty (or specific parts of it).

In addition to the evidence provided by deaf aphasics there is also considerable experimental evidence showing that sign language grammar – like spoken language grammar – resides in the left hemisphere. These findings are important because they show that the left hemisphere is lateralised for language – an abstract system of symbols and rules – and not simply for hearing or speech. Language can be realised in different modalities, spoken or signed, but is organised in the brain in the same way, regardless of modality.

The kind of selective impairment that we find in people with aphasia has provided important information regarding where and how language is localised in the brain. It also tells us that language is a separate cognitive module – meaning aphasics can be otherwise cognitively normal – and also that within language, separate components can be differentially affected by damage to different regions of the brain.

Acquired dyslexia

Evidence concerning the organisation of the lexicon and how we access it is also provided by people with **acquired dyslexia**, a disorder in which reading ability is disrupted due to brain damage to the left hemisphere. Two types of acquired **dyslexia** have been identified, each with different effects.

People with **deep dyslexia** make word substitutions such as:

Stimulus	Response 1	Response 2
act	play	play
applaud	laugh	cheers
example	answer	sum
heal	pain	medicine
south	west	east

The patient who gave these responses was unable to read the stimulus word presented on a card, though his responses were semantically related to the target, indicating that he was able to get to the correct lexical neighbourhood but retrieved the wrong item.

People with deep dyslexia also have particular difficulty reading function words such as prepositions, conjunctions and auxiliaries. The patient who produced the semantic substitutions cited previously was also agrammatic and was not able to read function words at all. When presented with words such as *which* or *would*, he just said, 'No' or 'I hate those little words'. However, he could read homophonous nouns and verbs, though with many semantic mistakes, as shown in the following:

Stimulus	Response	Stimulus	Response
witch	witch	which	no!
bean	soup	been	no!
hour	time	our	no!
eye	eyes	I	no!
hymn	bible	him	no!
wood	wood	would	no!

These errors, like those of people with agrammatic aphasia, provide evidence that content words and function words are processed in different brain areas or by different neural mechanisms, further supporting the view that both the brain and language are structured in a complex, modular fashion.

Fluent readers can access a familiar word in the mental lexicon just by seeing it, without sounding it out. People with **surface dyslexia** cannot do this. They must 'sound out' every word, just like a beginning reader or an adult encountering a new word. This makes reading difficult and laborious and makes many words unreadable in a language like English with a very opaque spelling system. Like aphasia, deep dyslexia and surface dyslexia provide information about lateralisation of the mental lexicon to the left hemisphere and about its nature, organisation and access routes.

acquired dyslexia
The loss of ability to read correctly by people who were previously literate, following brain damage.

dyslexia
A cover term for the various types of reading impairment.

deep dyslexia
A reading disorder in which the dyslexic person makes substitutions with semantically similar words

surface dyslexia
A reading disorder in which the dyslexic person has difficulty reading words that have to be memorised because they are not pronounced in the way they are spelt.

Japanese readers provide additional evidence regarding hemispheric specialisation. The Japanese language has two main writing systems. One system, kana, is based on the sound system of the language and each symbol corresponds to a syllable. The other system, kanji, is ideographic and each symbol corresponds to a word. (More about this in Chapter 11 on writing systems.) Kanji is not based on the sounds of the language. Japanese people with left-hemisphere damage are impaired in their ability to read kana, whereas people with right-hemisphere damage are impaired in their ability to read kanji. In addition, experiments with unimpaired Japanese readers show that the right hemisphere is better and faster than the left hemisphere at reading kanji and conversely, the left hemisphere does better with kana, though the left hemisphere can read both systems.

Brain imaging in aphasic patients

Today we no longer need to rely on surgery or autopsy to locate brain lesions or to identify the language regions of the brain. Modern non-invasive brain recording technologies, such as computed tomography (CT) scans and **magnetic resonance imaging (MRI)**, can reveal lesions in the living brain shortly after the damage occurs. In addition, **positron emission tomography (PET)** and **functional magnetic resonance imaging (fMRI)** scans reveal the brain in action by measuring blood flow and oxygen utilisation in different areas of the brain during the performance of various linguistic and other cognitive tasks. It is now possible to detect changes in brain activity and to relate these changes to localised brain damage and specific linguistic and non-linguistic cognitive tasks.

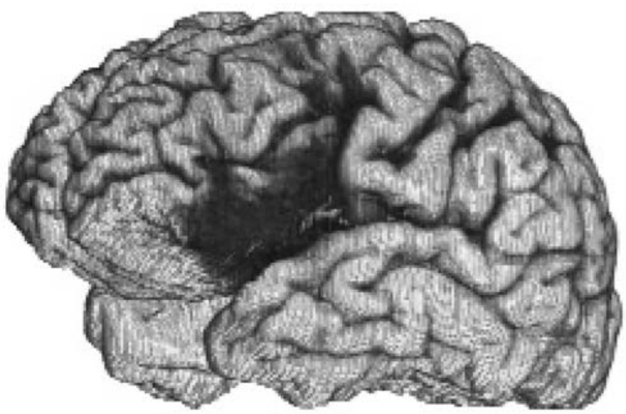
magnetic resonance imaging (MRI)
A technique to investigate the molecular structures in human organs, including the brain, which may be used to identify sites of brain lesions.

positron emission tomography (PET)
A technique to detect changes in brain activities and relate these changes to localised brain damage and cognitive tasks.

functional MRI (fMRI)
A technique that measures small changes in blood flow that occur over time as a consequence of neural activity.

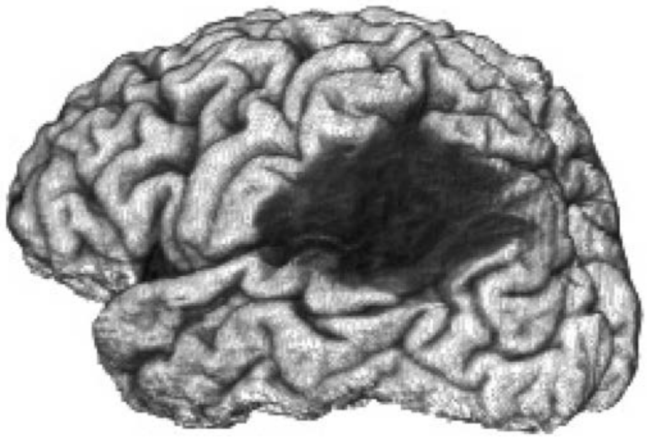
Figures 8.7 and 8.8 show MRI scans of the brains of a Broca's aphasic patient and a Wernicke's aphasic patient. The dark grey areas show the sites of the lesions. Each diagram represents a slice of the left side of the brain.

Figure 8.7 **Three-dimensional reconstruction of the brain of a living patient with Broca's aphasia. Note area of damage in the left frontal region (dark grey), which was caused by a stroke.**



Courtesy of Hanna Damasio

Figure 8.8 **Three-dimensional reconstruction of the brain of a living patient with Wernicke's aphasia. Note area of damage in left posterior temporal and lower parietal region (dark grey), which was caused by a stroke.**



Courtesy of Hanna Damasio

Dramatic evidence for a differentiated and structured brain is also provided by studies of normal individuals and of patients with lesions in regions of the brain other than Broca's and Wernicke's areas. Some patients have difficulty speaking a person's name, others have problems naming animals and still others cannot name tools. fMRI studies have revealed the shape and location of the brain lesions in each of these types of patients. The patients in each group had brain lesions in distinct, non-overlapping regions of the left temporal lobe. In a follow-up PET scan study, normal subjects were asked to name people, animals or tools. Experimenters found that there was differential activation in the normal brains in the same areas that were damaged in the aphasics who were unable to name persons, animals or tools. Similarly, some brain-damaged patients lose their ability to recognise sounds or colours or familiar faces while retaining all other functions. A patient may not be able to recognise his wife when she walks into the room until she starts to talk. This suggests the separability of many aspects of visual and auditory processing. Other sources of evidence concerning the functional differences between the left and right hemispheres are provided by individuals who have undergone brain surgery for certain medical conditions. We consider this in the next section.

Split brains

> It takes only one hemisphere to have a mind.
>
> A.L. Wigan, *The Duality of the Mind*, 1844

An extreme measure used to help people suffering from intractable epilepsy is a procedure in which surgeons sever the corpus callosum (see **Figure 8.3**), the fibrous network that connects the two halves. When this pathway is severed, there is no communication between the 'two brains', making it possible to test the functions of each (now isolated) hemisphere without interference from the other. Such **split-brain** patients provide evidence for language lateralisation and for understanding contralateral brain functions.

split brain
The result of an operation for epilepsy in which the **corpus callosum** is severed, thus separating the brain into its two hemispheres. Split-brain patients are studied to determine the role of each hemisphere in cognitive and language processing.

In humans who have undergone split-brain operations, the two hemispheres appear to be independent and messages sent to the brain result in different responses depending on which side receives the message. For example, if a pencil is placed in the left hand of a split-brain person whose eyes are closed, the person can use the pencil appropriately but cannot name it because only the left hemisphere can speak. The right brain senses the pencil but the information cannot be relayed to the left brain for linguistic naming because the connections between the two halves have been severed. By contrast, if the pencil is placed in the right hand, the subject is immediately able to name it as well as to describe it because the sensory information from the right hand goes directly to the left hemisphere, where the language areas are located.

Studies of human split-brain patients have also shown that when the interhemispheric visual connections are severed, visual information from the right and left visual fields becomes confined to the left and right hemispheres, respectively. Because the left hemisphere is crucially endowed with language capabilities, written material delivered to the right hemisphere cannot be read if the brain is split, because the information cannot be transferred to the left hemisphere. An image or picture that is flashed to the right visual field of a split-brain patient (and therefore processed by the left hemisphere) can be named. However, when the picture is flashed in the left visual field and therefore lands in the right hemisphere, it cannot be named. It is only under special, experimental circumstances that independent functions of the hemispheres are revealed. Under normal living circumstances both hemispheres have access to whatever a person sees or hears.

Experiments of this sort have provided information on the different capabilities of the two hemispheres. The right brain does better than the left in pattern-matching tasks, in recognising faces, and in spatial tasks. The left hemisphere is superior for language, rhythmic perception, temporal-order judgements, and arithmetic calculations. According to the psychologist Michael Gazzaniga, 'the right hemisphere as well as the left hemisphere.'

Neural evidence of grammatical phenomena

> The human brain is a most unusual instrument of elegant and as yet unknown capacity.
>
> Stuart Seaton

Thanks to the invention of imaging and other technologies, much can be learnt about the lateralisation of language and other cognitive functions from looking at healthy brains. Experimental tests of unimpaired people are used to map the brain and to investigate the independence of different aspects of language as well as the independence of language from other cognitive systems.

event-related potentials (ERPs)
The electrical signals emitted from different areas of the brain in response to different kinds of stimuli.

magneto-encephalog-raphy (MEG)
A neuroimaging technique used to measure magnetic fields generated by the brain.

In addition to fMRI and fPET discussed earlier, other widely used techniques include **event-related potentials (ERPs)** and **magnetoencephalography (MEG)**. Event-related potentials are the electrical signals emitted from the brain in response to different linguistic stimuli and can be monitored through electrodes taped to different areas of the skull. This technique, based on EEG (electroencephalogram) readings, exploits the fact that the brain is electrically active and that this electrical activity can be measured both for its strength (amplitude) and for its pattern of responses over time.

MEG is a brain imaging technique that is beginning to be used to answer specific questions about how language develops in the brain, and how language is processed by adults. MEG is quiet, non-invasive and without known side effects, so it can safely and comfortably be used for language research with children and special patient populations, as well as adults. It is useful for studying fast cognitive processes, such as language, because it has excellent temporal resolution, recording brain responses with millisecond accuracy.

MEG measures the magnetic fields that are generated by the brain whenever we process information. The magnetic fields are very tiny, so the MEG system requires a room that is shielded from other magnetic fields. The magnetic fields are measured by sensors called SQUIDs (Superconducting Quantum Interference Devices), which are cooled by liquid helium to −270 degrees Celsius, almost as cold as outer space. To measure magnetic activity generated by the brain, participants sit in a chair or lie on a bed, with their head positioned inside a helmet containing the SQUID sensors. To ensure accurate recording, participants must lie very still. Figure 8.9 shows a child being instructed to 'freeze like a statue' in an MEG simulator, prior to entering the magnetically shielded room that houses the actual MEG system. In the simulator, children pretend that they are training to be astronauts.

Figure 8.9 **A child training in an MEG simulator**

Photo by Christopher Stacey

Because MEG measures children's brain responses directly, it can be used to document children's language development without requiring children to perform the kinds of psychological tasks that are used to assess linguistic knowledge in adults, such as grammaticality judgement tasks. The fact that children's heads are smaller than those of adults, combined with the need to have the MEG sensors close to the head, has recently led to customised paediatric MEG systems with smaller helmets.

MEG measures brain activity directly and in real time (unlike MRI), and brain signals are not distorted by tissue, blood or bone (unlike electroencephalography [EEG]). This makes MEG an excellent technique for addressing questions about language processing by adults. Adult participants may be asked to listen to two or more sounds and determine if they are the same. Or they may be asked to listen to strings of sounds or read a string of letters and determine if they are real or possible words, or to listen to or read sequences of words and say whether they form grammatical or ungrammatical sentences.

Importantly, MEG can be used to study how language develops in the brain in children. A recent study measured brain responses by four-year-old children to pairs of sentences that differed minimally, ones that were well formed, like *Nobody ate any of the fruit*, versus ones that contained an anomalous word, such as *Everybody ate *any of the fruit*. This study shows the potential of MEG to answer questions about children's linguistic knowledge without asking them to make conscious decisions or metalinguistic judgements. This is useful because children generally cannot make judgements about acceptability until they are five- or six-years old.

Neurolinguistic studies of speech sounds

These new techniques have provided many insights into how the human brain responds to sounds. A first important finding is that the brain reacts differently to speech versus non-speech sounds. ERP responses are greater from the left hemisphere when the participant hears speech sounds.

Many studies also provide neurolinguistic evidence for the categories and concepts that linguists postulate in their descriptions of sound systems. Experiments using ERPs and MEG have shown a neural reflex of categorical perception: The brain reacts differently to sounds that are phonemically different (e.g. [t] and [k]) than to sounds that are acoustically distinct (e.g. [p] and [p^h] but non-phonemic. The overall patterns of response to phonemes versus allophones differs in intensity, speed, and location in the brain. An fMRI experiment involving French and Japanese speakers has demonstrated distinct response patterns for phonotactically permissible versus impermissible sequences of sounds in their language as well as faster reaction times to the phonotactically correct sequences. Similar results have been found in studies of deaf signers who show different neurological responses to phonotactically permissible and impermissible hand configurations in sign language.

Neurolinguistic studies of sentence and word structure

Modern technologies have also been used to examine the brain's response to the syntactic patterns of language. ERP experiments show variations in timing, pattern, amplitude and hemisphere of response when experimental participants hear sentences that are meaningless, such as:

The man admired Don's headache of the landscape.

as opposed to meaningful sentences such as:

The man admired Don's sketch of the landscape.

Even Jabberwocky sentences – sentences that are grammatical but contain nonsense words, such as Lewis Carroll's *'Twas brillig, and the slithy toves* – elicit an asymmetrical left-hemisphere ERP response, demonstrating that the left hemisphere is sensitive to grammatical structure even in the absence of meaning. Such findings provide neurological evidence for the separation between syntax and semantics posited by linguists. Moreover, because ERPs also show the timing of neuronal activity as the brain processes language, they can provide insight into the mechanisms that allow the brain to process language quickly and efficiently, on the scale of milliseconds.

Another set of studies has examined brain responses to syntactic dependencies of the sort shown in *wh*-questions (see Chapter 5). Participants in experiments hear sentences in which the underlying subject or object has been moved to the beginning of the sentence. In the case of a moved subject the movement is shorter and the basic word order is kept:

Who ____ left the room?

On the other hand, movement from the object position as in the example below involves a longer distance between the moved element (*which bagel*), which psycholinguists call the 'filler', and the position from which it moves, referred to as the 'gap'.

Which bagel did Seymour slice ____?

Various studies show that the sentences with moved objects elicit longer response times than sentences with moved subjects, providing neural correlates of different *wh*-movements (as discussed in Chapter 5).

Many neurolinguistic studies have examined the brain's response to ungrammatical sentences, manifested by a type of ERP pattern called a mismatch negativity (MMN). These experiments find that different types of ungrammatical sentences evoke distinct waveforms. Violations of phrase structure, C-selection, agreement rules, among others produce a specific neural 'signature'.

Interestingly, the brain responds at once to morphosyntactic violations (e.g. *a boys is running*) and does so outside the scope of attention. In one study, participants were divided into three groups: one group simply listened to grammatical and ungrammatical phrases; another watched a video while listening to the same phrases; and a third performed a complex auditory task while listening to the phrases. An MMN response to the syntactic violations was almost immediate, within the first 100 to 200 milliseconds after hearing the phrase, and the response was equally rapid and strong whether or not the listeners had to perform another task. Particularly striking was the response of those subjects who had to do the auditory task. They had the same strong MMN response, showing that even a complex task requiring considerable attention *in the same* *auditory modality* did not compete with syntactic processing. The results of this study demonstrate that syntactic processing is like a reflex, in being both automatic and attention-free.

Recent studies have also used fMRI to examine brain activation for morphosyntactic processes, including past tense, present tense and agreement morphology. The results showed different neural signatures for the different inflectional morphemes, and was also distinct from the neural reflex of processing bare verb stems.

Experimental evidence from these various neurolinguistic experiments has provided considerable insight into how the brain processes language, and has also lent empirical support to many of the abstract categories, rules, concepts and components of grammar.

Language and brain development: left hemisphere lateralisation

> If the brain were so simple we could understand it, we would be so simple we couldn't.
>
> Lyall Watson (1939–2008)

Numerous neurolinguistic studies have found that the way the brain is organised for language and grammar in the adult is already reflected in the brains of newborns and young infants – even before they have entered the period during which language actively develops. Lateralisation of language to the left hemisphere is a process that begins very early in life. For example, the Wernicke's area is visibly distinct in the left hemisphere of the foetus by the twenty-sixth gestational week. Moreover, infants show evidence of many of the neural correlates of linguistic categories that we observe in adults.

Everyone loves a smiling baby, but babies' smiles do more than light up a room. They reveal something very important about how the developing brain is organised for language. In a very intriguing study, researchers videotaped smiling babies and babbling babies (i.e. producing syllabic sequences like *mamama* or *gugugu*) between the ages of five and twelve months. The videotapes showed that when the babies were smiling their mouths were opened wider on the left side (the side controlled by the right hemisphere) whereas when they babbled the *right* side of their mouths (controlled by the left hemisphere) were opened wider, indicating greater left hemisphere involvement for language even during the babbling period (see Chapter 7).

Many other studies of infants and young children support this conclusion. For example, infants as young as one week old show a greater electrical response in the left hemisphere to language and in the right hemisphere to music, similar to adults. A study measuring brain activation in awake and sleeping three-month-old infants when hearing forward and backward speech showed that different areas of the cortex responded in the two cases.

We noted in previous chapters, that behavioural tests show that infants – like adults – perceive speech sounds categorically. ERP studies have found neurological correlates of categorical perception in infants, just as for adults. These studies show that the infant brain responds differently, and with the same pattern and speed as found in adults, to *phonemic* categories than to non-phonemic acoustic distinctions. This neural pattern occurs even in sleeping babies, showing that the response is automatic and does not require the attention of the infant.

These and similar experiments show that from birth onward, the left hemisphere differentiates between non-linguistic acoustic processing and the linguistic processing of sounds, and uses the same neural pathways as adults. Other studies indicate the same holds true for syntax. Very young children seem to process syntactic structures in the same area of the brain and with the same neurological indices as adults, albeit slightly more slowly. In one study, two-year-olds listened to grammatical and ungrammatical sentences. Some of the ungrammatical sentences had nouns where verbs should be, and some had verbs in noun positions. The toddlers showed a clear left-lateralised response to the ungrammatical sentences and even different patterns for the noun versus verb substitutions.

Brain plasticity

While the left hemisphere is innately predisposed to specialise for language, there is also evidence of considerable plasticity (i.e. flexibility) in the system during the early stages of language development. This means that under certain circumstances, the right hemisphere can take over many of the language functions that would normally reside in the left hemisphere.

An impressive illustration of plasticity is provided by children who have undergone a procedure known as **hemispherectomy**, in which one hemisphere of the brain is surgically removed. This procedure is used to treat otherwise intractable cases of epilepsy. In cases of left hemispherectomy after language acquisition has begun, children experience an initial period of aphasia and then reacquire a linguistic system that is virtually indistinguishable from that of normal children. They also show many of the development patterns of normal language acquisition. Researchers from the University of California, Los Angeles (UCLA) who have studied many of these children hypothesise that the latent linguistic ability of the right hemisphere is 'freed' by the removal of the diseased left hemisphere, which may have had a strong inhibitory effect before the surgery.

hemi-sperectomy The surgical removal of a hemisphere of the brain.

In adults, however, surgical removal of the left hemisphere inevitably results in severe loss of the language function (and so is done only in life-threatening circumstances), whereas adults (and children who have already acquired language) who have had their right hemispheres removed retain their language abilities. Other cognitive losses may result, such as those typically lateralised to the right hemisphere. The plasticity of the brain decreases with age and with the increasing specialisation of the different hemispheres and regions of the brain.

Despite strong evidence that the left hemisphere is predetermined to be the language hemisphere in most humans, some evidence suggests that the right hemisphere plays a role at the earliest stages of language acquisition. Children with prenatal, perinatal or childhood brain lesions in the right hemisphere can show delays and impairments in babbling and vocabulary learning, whereas children with early left hemisphere lesions demonstrate impairments in their ability to form phrases and sentences. Also, many children who undergo right hemispherectomy before two years of age do not develop language, even though they still have a left hemisphere.

Various findings converge to show that the human brain is essentially designed to specialise for language in the left hemisphere but that the right hemisphere is involved in early language development. They also show that, under the right circumstances, the brain is remarkably resilient and that if brain damage or surgery occur early in life, normal left hemisphere functions can be taken over by the right hemisphere.

Delayed exposure to language

What if children's exposure to language is delayed or children cannot access linguistic input? How does this impact their language development? Under normal circumstances, children are introduced to language at the moment of birth. Adults talk to their children and to each other in their children's presence. Children do not require explicit language instruction, but they do need exposure to language in order to develop normally. Children who do not receive linguistic input during their formative years do not achieve native-like grammatical competence. Moreover, behavioural tests and brain imaging studies show that late exposure to language alters the fundamental organisation of the brain for language. The resilience of the human desire to communicate cannot be ignored, however. Children who receive little or no linguistic input find ways to gesture, and in certain conditions, create language-like structure, which over generations, can become a natural language.

The critical period

The **critical age hypothesis** assumes that language is biologically based and states that the ability to learn a native language develops within a fixed period, from birth to middle childhood. During this **critical period**, language acquisition proceeds easily, swiftly and without external intervention. After this period, the acquisition of grammar is difficult and for most individuals never fully achieved. Children deprived of language during this critical period show atypical patterns of brain lateralisation.

Many species have a critical period for specific, biologically-triggered behaviours. Ducklings, for example, during the period from nine to twenty-one hours after hatching, will follow the first moving object they see, whether or not it looks or waddles like a duck. Such behaviour is not the result of conscious decision, external teaching or intensive practice. It unfolds according to what appears to be a maturationally determined schedule that is universal across the species. Similarly, as discussed in Chapter 1, certain species of birds develop their birdsong during a biologically determined window of time.

Instances of children raised in environments of extreme social isolation constitute 'experiments in nature' for testing the critical age hypothesis. The most dramatic cases are those described as 'wild' or 'feral' children. A celebrated case, documented in François Truffaut's film *The Wild Child*, is that of Victor, 'the wild boy of Aveyron', who was found in 1798. It was ascertained that he had been left in the woods when very young and had somehow survived. In 1920 two children, Amala and Kamala, were found in India, supposedly having been reared by wolves. Other children have been isolated because of deliberate efforts to keep them from normal social interaction. We discuss some cases that have been prominent in the literature. Regardless of the cause of isolation, none of these children were able to speak or knew any language at the time they were reintroduced into society. This linguistic inability could simply be caused by the fact that these children had received no linguistic input, suggesting that language acquisition, although an innate, neurologically based ability, must be triggered by input from the environment.

critical age hypothesis
The theory that states that there is a window of time between birth and middle childhood for learning a first language, beyond which first-language acquisition is almost always incomplete.

critical period
The time between birth and puberty during which a child can acquire language easily, swiftly and without external intervention. After this period, acquisition of the **grammar** is difficult and, for some individuals, never fully achieved. Children deprived of language during this critical period show atypical patterns of brain **lateralisation**.

Late exposure: Genie

In 1970 a child, called Genie in the scientific reports, was discovered. She had been confined to a small room under conditions of physical restraint and had received only minimal human contact from the age of 18 months until almost 14 years.

Genie was able to learn a large vocabulary, including colours, shapes, objects, natural categories and abstract as well as concrete terms, but her grammatical skills never developed fully. The UCLA linguist Susan Curtiss, who worked with Genie for several years, reported that Genie's utterances were, for the most part,

> 'the stringing together of content words, often with rich and clear meaning, but with little grammatical structure'.

Many utterances produced by Genie at the age of 15 and older, several years after her emergence from isolation, were like those of two-year-old children and not unlike utterances of Broca's aphasia patients and people with specific language impairment (SLI, to be discussed), such as:

Man motorcycle have.
Genie full stomach.
Genie bad cold live father house.
Want Curtiss play piano.
Open door key.

Genie's utterances lacked articles, auxiliary verbs like *will* or *can*; the third-person singular agreement marker *-s*; the past-tense marker *-ed*; question words like *who*, *what* and *where*; and pronouns. She had no ability to form more complex types of sentences, such as questions requiring a change in word order of verb and subject NP (e.g. *Are you hungry?*). Genie started learning language after the critical period and was therefore never able to fully acquire the grammatical rules of English.

Tests of lateralisation (ERP experiments and others) showed that Genie's language was lateralised to the right hemisphere. Her test performance was similar to that found in split-brain and left hemispherectomy patients, yet Genie was not brain damaged. Curtiss speculates that after the critical period, the usual language areas functionally atrophy because of inadequate linguistic stimulation. Genie's case also demonstrates that language is not the same as communication, because Genie was a powerful non-verbal communicator, despite her limited ability to acquire language.

Late exposure: Chelsea

Another case of linguistic isolation is seen in Chelsea, a woman whose situation also supports the critical age hypothesis. Chelsea was born deaf but was incorrectly diagnosed as having an intellectual disability. When she was 31, her deafness was finally diagnosed and she was fitted with hearing aids. For years she received extensive language training and therapy and acquired a large vocabulary. She could even invent new words when she did not have a word for something in her lexicon (e.g. *doctor tie* for *stethoscope*). Reports suggest that, like Genie, Chelsea readily learnt new words, but she was even more impaired than Genie in the ability to develop a grammar. While Genie developed some grammatical knowledge, such as the ability to distinguish transitive and intransitive verbs, Chelsea developed no knowledge of grammar at all. ERP studies of Chelsea's brain have revealed an equal response to language in both hemispheres. In other words, like Genie, Chelsea also failed to show the normal asymmetric brain organisation for language.

Late exposure to sign

There are other contexts in which children's exposure to language is delayed. This is often the case for the 90 per cent of children who are born deaf to hearing parents. Because most of their parents do not know sign language at the time these children are born, some receive delayed exposure to a natural language. Several studies have investigated the acquisition of American Sign Language (ASL) among deaf signers exposed to language at different ages. Early learners who received sign language input from birth and up to six years of age did much better in the production and comprehension of complex sign language morphology than late learners who were not exposed to ASL until after the age of 12, even though all of the subjects in these studies had used sign language for more than 20 years. There was little difference, however, in vocabulary or knowledge of word order.

In a study comparing patterns of lateralisation in the brains of adult native speakers of English, adult native signers and deaf adults who had not been exposed to sign language, the non-signing deaf adults did not show the same cerebral asymmetries as either the hearing adults or the deaf signers. In recent years there have been numerous studies of late learners of sign language, all with similar results.

A recent study reports that only children with hearing loss whose hearing was successfully remediated (i.e. by cochlear implants or hearing aids) by the age of eight months went on to develop rich grammars. This finding suggests the developmental 'window of opportunity' for acquiring complex syntax may be far smaller than previously thought.

Language creation in deaf children

Our discussion has focused on the fact that language development is most successful when exposure to language is provided within the critical period, the earlier the better. However, even in cases where children with moderate to profound hearing loss do not receive early exposure to language, or do not receive linguistic input that is accessible, children develop a gestural system of **home sign** and impose some language-like structure on their own gestural output. It has also been documented that a community of deaf children will develop, over time, a gestural system that increasingly demonstrates the hallmarks of a natural language. This has been documented in the birth of Nicaraguan sign language (NSL), which we will discuss more in the following.

home sign
The gestural system made up by deaf children to communicate with their hearing family.

Developmental psychologist Susan Goldin-Meadow has studied the gestural home sign systems developed by deaf children of hearing parents in communities with different cultural conventions. One study investigated in depth the home sign of four three- and four-year-old children in Taiwan and the US.[1] As one can imagine, the gestures accompanying speech used by hearing adult speakers of Mandarin in Taiwan and by adult speakers of English in the US differ. Both Mandarin and English share a basic SVO word order, however. The children in the study were attending oral schools but were not able to produce more than an occasional spoken word. The study compared the gestures produced by the children and their mothers to communicate in the home. An interesting finding was that the mothers used SVO word order in their gestures, reflecting spoken Mandarin or English. The children, on the other hand, produced gestural 'sentences' with the structure of the class of languages known as **ergative languages**.

ergative language
An ergative language is one in which the actor of an intransitive sentence and the patient of a transitive sentence are treated in the same way morphologically or syntactically. Examples of ergative languages are Samoan, Tongan, Basque and Georgian.

In ergative languages, the 'actor' of an intransitive sentence is treated linguistically like the 'patient' in a transitive sentence. In languages like English and Mandarin, the 'actor' of both transitive and intransitive sentences is treated in the same way – it comes before the verb. In ordering their gestures children produced the actor first for intransitive sentences; if they were signing 'the mouse goes to the hole' then they would sign 'mouse' before 'go'. However, for transitive sentences, such as 'the mouse eats the cheese', the children would sign 'cheese' first, before 'eat'. If they included a sign for the actor 'mouse' it came after the verb. This ordering of gestures was not used by the mothers, who would have presumably signed 'mouse' then the verb and the direct object 'cheese'. This finding strongly suggests that the grammatical structure seen in the children's gestural system was not derived from the spoken language being used in the environment. Rather, the suggestion is that children were drawing on innate linguistic knowledge in the 'language-ready' brain to come up with a consistent gestural system to communicate. The system they came up with is one that is used in other languages of the world.

Worked example

The ordering of children's 2-gesture signs

'The mouse goes to the hole' Children's 2-gesture home sign: *Mouse* go	Intransitive verb No direct object 'to the hole' is a preposition phrase
'The mouse eats the cheese' Children's 2-gesture home sign: *Cheese* eat	Transitive verb Direct object 'cheese' is direct object of verb 'eat'

A striking case of language creation has been witnessed in the emergence of sign language in Nicaragua. According to reports, before the 1970s, there were few services for children who were deaf, and they mostly stayed at home with their families, developing their own idiosyncratic home sign. The situation changed with the opening of an elementary school in the late 1970s. The children were (rather unsuccessfully) taught Spanish through oral methods at school, but outside of school, the children met and began to develop a consistent gestural system for communicating with each other. As its use continued with successive cohorts of children entering the school in the 1980s and later, the gestural system became more complex and developed into what is now known as Nicaraguan Sign Language (NSL) (see also Chapter 9).

One study compared first, second and third cohort signers with the gestures produced by hearing Spanish speakers. Participants had to retell the events of a cartoon to a peer. All of the events were complex motion events, such as a cat rolling down a hill. The finding was that the first cohort of signers and the Spanish speakers tended to describe the event with one holistic movement with a downward spiralling motion in which manner (rolling) and path (downwards) were combined. The second and third cohort children split manner and path, showing rolling and the downward trajectory separately. By splitting the movement into manner and path, they demonstrated that language is made up of discrete parts that can be combined in various ways. The second and third cohorts of children made changes to the language that were never adopted by the first cohort of signers who would have been adolescents at that point, and no longer within the critical period.[2]

The cases of Genie and other children who have been isolated in childhood, as well as deaf late learners of a sign language show that children cannot fully acquire language unless they are exposed to it within the critical period – a biologically determined window of opportunity. This critical period is linked to brain lateralisation. The human brain is primed to develop language in specific areas of the left hemisphere, but the normal process of brain specialisation depends on early and systematic experience with language. Language acquisition plays a critical role in, and may even be the trigger for, the realisation of normal cerebral lateralisation for higher cognitive functions in general, not just for language.

Beyond the critical period, the human brain seems markedly impaired in the ability to acquire the grammatical aspects of language, even with substantial linguistic training or many years of exposure. However, it is possible to acquire words and various conversational skills after this point. This evidence suggests that the critical period holds for the acquisition of grammatical abilities, but not necessarily for all aspects of language. The selective acquisition of certain components of language that occurs beyond the critical period is reminiscent of the selective impairment that occurs in various language disorders, where specific linguistic abilities are disrupted. This selectivity in acquisition and impairment points to a strongly modularised language faculty. Language is autonomous and separate from other cognitive systems and is itself a complex system with various components.

The Modular mind: dissociations of language and cognition

> [T]he human mind is not an unstructured entity but consists of components which can be distinguished by their functional properties.
>
> Neil Smith and Ianthi-Maria Tsimpli, *The Mind of a Savant: Language Learning and Modularity*, 1995

The modular view of cognition and language is supported by various other case studies of individuals who show impairment in certain cognitive domains alongside normal or superior abilities in other areas. The individuals discussed in the following show dissociations between their linguistic abilities and other non-linguistic cognitive abilities. In some cases, their language abilities far outpace cognitive abilities, and in other cases, the reverse is true.

Linguistic savants

There are numerous cases of individuals with an intellectual impairment who, despite their disabilities in certain spheres, show remarkable talents in others. There are superb musicians and artists who need support to perform activities of daily living. Such people are referred to as **savants**. Some of the most famous savants, such as Kim Peek (pictured in Figure 8.10), are human calculators who can perform arithmetic computations at phenomenal speed, or calendrical calculators who can tell you without pause on which day of the week falls any date in the last or next century.

savant
An individual who shows special abilities in one cognitive area while being deficient in others. Linguistic savants have extraordinary language abilities but are deficient in general intelligence.

Until recently, most such savants have been reported to face challenges in acquiring language. They may be good mimics and able to repeat speech like parrots, but they show meagre creative language ability. Nevertheless, the literature reports cases of language savants who have acquired the highly complex grammar of their language (as well as other languages, in some cases) but who lack non-linguistic abilities of equal complexity. Laura and Christopher are two such cases.

Figure 8.10 Savant Kim Peek

Shutterstock Premier/ITV/Rex

Linguistic savant: Laura

Laura was an intellectually impaired young woman with a non-verbal IQ of 41 to 44. She lacked almost all number concepts, including basic counting principles, and could draw only at a preschool level. She had an auditory memory span limited to three units. Yet, when at the age of 16 she was asked to name some fruits, she responded with 'pears, apples and pomegranates'. In this same period she produced syntactically complex sentences, such as 'He was saying that I lost my battery-powered watch that I loved' and 'She does paintings, this really good friend of the kids who I went to school with and really loved' and 'I was like 15 or 19 when I started moving out of home'.

Laura could not add 2 + 2. She did not know her own age or how old she was when she moved away from home, nor whether 15 is before or after 19. Nevertheless, Laura produced complex sentences with multiple phrases. She used and understood passive sentences, and she was able to inflect verbs for number and person to agree with the subject of the sentence. She formed past tenses in accord with adverbs that referred to past time. She could do all this and more, but she could not read or write or tell the time. She did not know who the president of the US was or what country she lived in. Her drawings of humans resembled potatoes with stick arms and legs. Yet, in a sentence imitation task, she was able to detect and correct grammatical errors.

Laura is but one of many examples of individuals who display well-developed grammatical abilities, less-developed abilities to associate linguistic expressions with the objects they refer to, and severe challenges in non-linguistic cognition.

Linguistic savant: Christopher

Another linguistic savant, Christopher, has a non-verbal IQ between 60 and 70. He requires support for the tasks of everyday living. He requires assistance to button his shirt, cut his fingernails or vacuum the carpet. However, in contrast to the challenges he faces in daily living, his linguistic competence is rich and sophisticated. For example, when given written texts in some 15 to 20 languages, he translates them quickly, with few errors, into English. The languages include Germanic languages, such as Danish, Dutch and German, and Romance languages, such as French, Italian, Portuguese and Spanish; as well as Polish, Finnish, Greek, Hindi, Turkish and

Welsh. He learnt these languages from speakers who used them in his presence or by studying grammar books. Christopher loves to study and learn languages. Little else is of interest to him. His situation strongly suggests that his linguistic ability is independent of his general intellectual ability.

The question as to whether the language faculty is a separate cognitive system or whether it is derivative of more general cognitive mechanisms is controversial. It has received much attention and debate among linguists, psychologists, neuropsychologists and cognitive scientists and remains a controversial issue today. Cases such as Laura's and Christopher's argue against the view that linguistic ability derives from general intelligence, because these two individuals (and others like them) developed language despite other pervasive intellectual impairments. These cases are used to support the view that humans are biologically equipped from birth with an autonomous language faculty that is highly specific and that does not derive from general human intellectual ability.

Specific language impairment

People like Laura and Christopher have excellent linguistic skills despite the fact that they have an intellectual impairment. There are also individuals who show the opposite profile – difficulties with language despite cognitive abilities in the normal range in other areas, such as general intelligence.

specific language impairment (SLI)
Difficulty in acquiring language faced by certain children with no other cognitive deficits.

developmental language disorder (DLD)
Difficulty in acquiring language experienced by certain children.

The term **specific language impairment (SLI)** is used to describe individuals who do not have cognitive deficits or perceptual problems and yet nevertheless have difficulty acquiring language. These children's cognitive ability is generally measured by non-verbal IQ (tested by matching abstract designs and so on) and is in the normal range. They nevertheless have difficulty with aspects of language. Children with SLI are another illustration that cognitive abilities and language can be dissociated. Estimates suggest that as many as one in seven children may fall in this category. It should be noted that the term **developmental language disorder (DLD)** has recently been adopted by many to replace the term specific language impairment. However, this is a broader term than specific language impairment and includes children with some degree of cognitive impairment.

Children with SLI do not have brain lesions, but they nevertheless have difficulties acquiring language or are much slower than the average child. Children with SLI have particular problems with use of the functional part of the grammar, especially with grammatical morphemes. The following examples from a four-year-old boy with SLI are typical:

Meowmeow chase mice.

Show me knife.

It not long one.

Research has found that the aspect of grammar that is most affected in English-speaking children with SLI is the use of the grammatical morphemes that are related to tense. In other languages, it is still the functional part of the grammar that is affected, but not necessarily tense. English-speaking children with SLI tend to omit the third-person singular *-s* present-tense marker, the past-tense *-ed* verb ending, and forms of auxiliary verbs, such as *is*, *are* and *does*. For this reason, difficulty with tense morphemes has been seen as an identifying characteristic (known as a 'clinical marker') for children and adults with SLI. A study by Mabel Rice and Ken Wexler found that five-year-old children with SLI used the third-person present tense *-s* only 36 per cent of the time in their spontaneous speech, as compared with 88 per cent use by typically developing five-year-olds. Similarly, the children with SLI tended to drop other tense-related morphemes as well; they used the past tense *-ed* only 22 per cent of the time in obligatory contexts as compared with 92 per cent use in the normal five-year-old group. What is interesting is that the children with SLI were much better at providing functional morphemes that are not related to tense. For example, the SLI group of children used the plural -*s* 88 per cent of the time, and the -*ing* marker showing action in progress 92 per cent of the time, while articles *a* and *the* were a bit lower at 62 per cent accuracy.[3] These findings support the proposal that morphemes related to tense impose a particular challenge for this group of individuals. The tendency to omit morphemes related to tense is also seen in children whose language is developing normally, but in children with SLI the tendency to omit these morphemes continues for an extended period of time. Overall, children with SLI show exactly the same pattern of grammatical 'growth' as typically developing children, but their development lags behind other children.

Other studies of children with SLI suggest grammatical impairments that go beyond difficulties with tense, and involve difficulties with certain grammatical structures, such as questions and structures in which a pronoun like *him* or *her* refers to another person in the sentence. However, the extent of the impairment is not yet known. In addition, ERP studies of certain children with SLI have shown that they do not exhibit the expected response levels for syntactic processing, which is compatible with the finding that these children do not process many syntactic structures in the same way as children whose language is developing in a typical manner.

As is the case with aphasia, studies of children with SLI provide important information about the nature of language and help linguists develop theories about the underlying properties of language and its development in children. Children with SLI show that language may be impaired while general intelligence, as measured by non-verbal IQ measures, is intact, supporting the view of a language faculty that is separate from other cognitive systems.

Genetic basis of language

Studies of genetic disorders also reveal that one cognitive domain can develop normally along with abnormal development in other domains; they too underscore the strong biological basis of language. Children with Turner syndrome (a chromosomal anomaly) have normal language and advanced reading skills along with serious non-linguistic (visual and spatial) cognitive deficits. Similarly, studies of the language of children and adolescents with Williams syndrome reveal a unique behavioural profile in which certain linguistic functions seem to be relatively preserved in the face of visual and spatial cognitive deficits and moderate intellectual impairment. In addition, developmental dyslexia and SLI also appear to have a genetic basis. And recent studies of Klinefelter syndrome (another chromosomal anomaly) show quite selective syntactic and semantic deficits alongside intact intelligence.

SLI has been observed to run in families, and epidemiological and familial aggregation studies are now underway so that it can be better understood. There have been many reports of one large multigenerational family, called the 'KE' family, half of whom are language-impaired and half of whom are unaffected. Early research claimed that members of this family showed a profile of specific language impairment, but this turned out not to be the case. In addition to having difficulties with grammatical development, affected members in this family also have severe problems associated with motor control of the face and mouth, making their speech difficult to understand. This family has been subject to much intense study and it is claimed that there is a genetic component to the condition that affects certain family members. Studies of twins show that monozygotic (identical) twins are more likely to both suffer from SLI than dizygotic (fraternal) twins, also pointing to a genetic basis to SLI.

Studies of SLI and other genetic disorders, along with the asymmetry of abilities in linguistic savants, strongly support the view that the language faculty is an autonomous, genetically determined module of the brain.

CHAPTER REVIEW

Summary

Psycholinguistics is concerned with linguistic performance or processing, which is the use of linguistic knowledge (competence) in speech production and comprehension.

Comprehension, the process of understanding an utterance, requires the ability to access the mental lexicon to match the words in the utterance to their meanings. Comprehension begins with the perception of the acoustic speech signal. Listeners who know a language have the ability to segment the stream into linguistic units and to recognise acoustically distinct sounds as the same linguistic unit.

Psycholinguistic studies are aimed at uncovering the units, stages and processes involved in linguistic performance. Several experimental techniques, including lexical decision tasks, have proved helpful in understanding lexical access. The measurement of response times (RTs), shows that it takes longer to retrieve less common words than more common words, longer to retrieve possible non-words than impossible non-words, longer to retrieve words with larger phonological neighbourhoods than ones with smaller neighbourhoods, and longer to retrieve lexically ambiguous words than unambiguous ones. A word may prime another word if the words are semantically, morphologically or phonologically related. The priming effect is shown by faster reaction times to related words than to unrelated words.

To comprehend the meaning of an utterance, the listener must parse the string into syntactic constituents. This is done according to the rules of the grammar of the language and also following structural parsing principles that favour simpler structures, although other factors, such as frequency of occurrence and subcategorisation information, can also influence the parser in its structural choices.

Language is filled with temporary ambiguities – points at which the sentence can continue in more than one way because a word is ambiguous in its syntactic category or because there are different structural possibilities. In such cases, the reader may 'go down a garden path' and have to backtrack and redo the parse.

Much of the best information about the units and stages of speech production comes from observing and analysing spontaneous speech, especially speech errors. Many of the same factors that influence the listener in comprehension also affect the speaker in production. Lexical access is influenced in both cases by semantic and phonological relatedness of words and word frequency.

Neurolinguistics is the study of the brain mechanisms and anatomical structures that underlie linguistic competence and performance. The brain is divided into two cerebral hemispheres, which are connected by the corpus callosum, a network that permits the left and right hemispheres to communicate. Language is lateralised to the left hemisphere of the brain. Much of the early evidence for language lateralisation came from the study of aphasia. Evidence for language lateralisation as well as the contralateral control of function is also provided by split-brain patients and by studying people with other neurological conditions, such as acquired dyslexia.

Advances in technology have provided a variety of non-invasive methods for studying the living brain as it processes language. By measuring electromagnetic activities (ERPs and MEG studies), and through imaging techniques, such as CT, MRI, fMRI, and fPET scans, both damaged and healthy brains can be observed and evaluated. These studies confirm earlier results concerning the lateralisation of language to the left hemisphere.

Lateralisation of language to the left hemisphere is a process that begins very early in life. While the left hemisphere is innately predisposed to specialise for language, there is also evidence of considerable plasticity in the system during the early stages of language development. The plasticity of the brain decreases with age and with the increasing specialisation of the different hemispheres and regions of the brain.

The timing of exposure to language is crucial. The critical-age hypothesis states that there is a window of opportunity for learning a first language. Within this time frame, children have the capability to acquire language, or, in the case of deaf children, create language if there is no appropriate language model in the environment.

The language faculty is modular. It is independent of other cognitive systems with which it interacts. Evidence for modularity is found in the selective impairment of language in aphasia, in children with specific language impairment (SLI), in linguistic savants, and in children who learn language past the critical period. Much neurolinguistic research is centred on experimental and behavioural data from people with impaired or atypical language. These findings greatly enhance our understanding of language structure and acquisition.

Exercises

1 Speech errors (i.e. 'slips of the tongue' or 'bloopers') illustrate a difference between linguistic competence and performance since our very recognition of them as errors shows that we have knowledge of well-formed sentences. Furthermore, errors provide information about the grammar. The following utterances were actually observed. A few are attributed to Dr Spooner.

a For each speech error, state what kind of linguistic unit or rule is involved, that is, whether it is phonological, morphological, syntactic, lexical or semantic.

b State, to the best of your ability, the nature of the error or the mechanisms that produced it. (*Note*: The intended utterance is to the left of the arrow and the actual utterance is to the right.)

Example: ad hoc ⟶ odd hack

a phonological vowel segment

b reversal or exchange of segments

Example: she gave it away ⟶ she gived it away

a inflectional morphology

b incorrect application of regular past-tense rule to exceptional verb

Example: When will you leave? ⟶ When you will leave?

a syntactic rule

b failure to move the auxiliary to form a question

i brake fluid ⟶ blake fruid

ii drink is the curse of the working classes ⟶ work is the curse of the drinking classes (Spooner)

iii I have to smoke a cigarette with my coffee ⟶ ... smoke my coffee with a cigarette

iv untactful ⟶ distactful

v an eating marathon ⟶ a meeting arathon

vi executive committee ⟶ executor committee

vii lady with the dachshund ⟶ lady with the Volkswagen

viii Are we taking a bus back? ⟶ Are we taking the buck bass?

ix he broke the crystal on my watch ⟶ he broke the whistle on my crotch

x a phonological rule ⟶ a phonological fool

xi pitch and stress ⟶ piss and stretch

xii Lebanon ⟶ lemadon

xiii speech production ⟶ preach seduction

xiv he's a New Yorker ⟶ he's a New Yorkan

xv I'd forgotten about that ⟶ I'd forgot abouten that

2 Consider the following ambiguous sentences. Explain the ambiguity, give the most likely interpretation and state what a computer would have to have in its knowledge base to achieve that interpretation.

Example: A cheesecake was on the table. It was delicious and was soon eaten.

a Ambiguity: *It* can refer to the cheesecake or the table.

b Likely: *It* refers to the cheesecake.

c Knowledge: Tables are not usually eaten.

i For those of you who have children and don't know it, we have a nursery downstairs. (Sign in a church)

ii The police were asked to stop drinking in public places.

iii Our bikinis are exciting; they are simply the tops. (Bathing suit ad in newspaper)

iv It's time we made smoking history. (Antismoking campaign slogan)

v Do you know the time? (*Hint*: This is a pragmatic ambiguity.)

vi Concerned with spreading violence, the prime minister called a press conference.

vii The ladies of the church have cast off clothing of every kind and they may be seen in the church basement on Friday. (Announcement in a church bulletin)

viii She earned little as a whisky maker but he loved her still.

ix The butcher backed into the meat grinder and got a little behind in his work.

x A dog gave birth to puppies near the road and was cited for littering.

xi A hole was found in the nudist camp wall. The police are looking into it.

xii A sign on the lawn at a drug rehab centre said, 'Keep off the grass'.

The following three items are newspaper headlines:

xiii RED TAPE HOLDS UP NEW BRIDGE

xiv KIDS MAKE NUTRITIOUS SNACKS

xv SEX EDUCATION DELAYED, TEACHERS REQUEST TRAINING

3 Create five sentences containing temporary ambiguities. For example, *Mary believed the boy was lying*. For each, explain how and when the ambiguity is resolved.

4 Consider the following two headlines:
PHYSICISTS THRILLED TO EXPLAIN WHAT THEY ARE DOING TO PEOPLE
TWO SISTERS UNITED AFTER 18 YEARS IN CHECKOUT LINE

- a What principle explains the unintended, funny interpretations of these headlines?
- b How might you reorganise the words in the headlines to get rid of the unintended meanings?
- c Check your local newspapers (or other sources) and see whether you can find similar examples.

5 Some sentences are more likely than others to give rise to a garden path effect even though they have the same structures. This is true of the sentence pairs below. Psycholinguistic experiments show that people misparse the following (i) sentences less than the (ii) sentences. Explain why.

- a i The frustrated tourists understood the snow would mean a late start.
  - ii The frustrated tourists understood the message would mean they couldn't go.
- b i The ticket agent admitted the airplane had been late taking off.
  - ii The ticket agent admitted the mistake had been careless and stupid.
- c i Mary Ann's mother feared the dress would get torn and dirty.
  - ii Mary Ann's mother feared the large wolf would escape from its cage.

6 Priming can be used not only by psycholinguists to study how language is organised in the brain but also to tell jokes and annoy your friends. Here are two jokes. Try them out on a number of people and report on what percentage 'fall for it'. In addition, explain why priming is significant in the effectiveness of these jokes and what is primed. It is different in the two cases.

- a Begin by asking your friend to respond quickly without thinking as you rapidly say:
  If a soft drink is a coke,
  And a funny story is a joke,
  What do you call the white of an egg?
  You will be amazed at how many people will answer 'yolk', whereas the answer is something like 'albumin'.
- b Begin by telling your friend: 'An airliner crashes, killing all aboard and comes to rest perfectly straddling the international border between the United States and Canada. Where do they bury the survivors?' Record the amount of time spent pondering this question before coming up with an answer. The answer doesn't matter; it may be one country or the other, or both, or simply 'I don't know'. In addition, record the percentage of subjects who realise that survivors are not (generally) buried.

7 What is the syntactic reason that the sentence *The horse raced past the barn fell* can present a temporary ambiguity to an English speaker, but not *The horse purchased in the barn fell*?

8 **Challenge exercise:** Nobel laureate Roger Sperry has argued that split-brain patients have two minds:

> Everything we have seen so far indicates that the surgery has left these people with two separate minds, that is, two separate spheres of consciousness. What is experienced in the right hemisphere seems to lie entirely outside the realm of experience of the left hemisphere.[4]

Another Nobel Prize winner in physiology, Sir John Eccles, disagreed. He did not think the right hemisphere can think; he distinguished between 'mere consciousness', which animals possess as well as humans; and language, thought and other purely human cognitive abilities. According to him, human nature is all in the left hemisphere.

Write a short essay discussing these two opposing points of view and state your opinion on how to define 'the mind'.

9 Some aphasic patients, when asked to read a list of words, substitute other words for those printed. In many cases there are similarities between the printed words and the substituted words.

a The following data are words presented to and responses from actual aphasic patients. In each case, state what the two words have in common and how they differ:

	Printed word	Word spoken by aphasic
i	liberty	freedom
	canary	parrot
	abroad	overseas
	large	long
	short	small
	tall	long
ii	decide	decision
	conceal	concealment
	portray	portrait
	bathe	bath
	speak	discussion
	remember	memory

b What do the words in groups (i) and (ii) reveal about how words are likely to be stored in the brain?

10 The following sentences spoken by aphasic patients were collected and analysed by Dr Harry Whitaker. In each case, state how the sentence deviates from normal non-aphasic language.

a There is under a horse a new sidesaddle.
b In girls we see many happy days.
c I'll challenge a new bike.
d I surprise no new glamour.
e Is there three chairs in this room?
f Mike and Peter is happy.
g Bill and John likes hot dogs.
h Proliferate is a complete time about a word that is correct.
i Went came in better than it did before.

11 The investigation of individuals with brain damage has been a major source of information regarding the neural basis of language and other cognitive systems. One might suggest that this is like trying to understand how an automobile engine works by looking at damaged engines. Is this a good analogy? If so, why? If not, why not? In your answer, discuss how a damaged system can and cannot provide information about the normal system.

12 What are the arguments and evidence that have been put forth to support the notion that there are two separate parts of the brain?

13 Discuss this statement: 'It only takes one hemisphere to have a mind'.

14 In early neurolinguistic research, dichotic listening tests in which subjects hear different kinds of stimuli in each ear were studied. These tests showed that there were fewer errors made in reporting linguistic stimuli, such as the syllables *pa*, *ta*, *ka*, when those stimuli were heard through an earphone in the right ear; non-linguistic sounds, such as a police-car siren, were processed with fewer mistakes if heard by the left ear. This is due to the contralateral control of the brain. There is also a technique that permits visual stimuli to be received by either the right visual field, that is, the right eye alone (going directly to the left hemisphere), or the left visual field (going directly to the right hemisphere). What might be some visual stimuli that could be used in an experiment to further test the lateralisation of language?

15 The following utterances were made by either Broca's aphasics or Wernicke's aphasics. Indicate which is which by writing a 'B' or 'W' next to the utterance.

a Goodnight and in the pansy I can't say but into a flipdoor you can see it.
b Well … sunset … uh … horses nine, no, uh, two, tails want swish.
c Oh … if I could I would, and a sick old man disflined a sinter, minter.
d Words …. words … words … two, four, six, eight … blaze am he.

16 **Challenge exercise:** Shakespeare's Hamlet surely had problems. Some say he was obsessed with being overweight because the first lines he speaks in the play when alone on the stage in *Hamlet*, Act II, Scene ii are:

> O! that this too solid flesh would melt
>
> Thaw, and resolve itself into a dew;

Others argue that he may have had Wernicke's aphasia, as shown by the following passage from Act II, Scene ii:

> Slanders, sir: for the satirical rogue says here
>
> that old men have grey beards, that their faces are
>
> wrinkled, their eyes purging thick amber and
>
> plum-tree gum and that they have a plentiful lack of
>
> wit, together with most weak hams: all which, sir,
>
> though I most powerfully and potently believe, yet
>
> I hold it not honesty to have it thus set down, for you
>
> yourself, sir, should be old as I am, if like a crab
>
> you could go backward.

Take up the argument. Was Hamlet aphasic? Argue the case for or against.

17 As discussed in the chapter, agrammatic aphasics may have difficulty reading function words, which are words that have little descriptive content, but they can read more contentful words, such as nouns, verbs and adjectives.

a Which of the following words would you predict to be difficult for such a person?

ore	bee	can (be able to)	but
not	knot	may	be
may	can (metal container)	butt	or
will (future)	might (possibility)	will (willingness)	might (strength)

b Discuss three sources of evidence that function words and content words are stored or processed differently in the brain.

18 The traditional writing system of the Chinese languages (e.g. Mandarin, Cantonese) is ideographic (i.e. each concept or word is represented by a distinct character). More recently, the Chinese government has adopted a spelling system called Pinyin, which is based on the Roman alphabet and in which each symbol represents a sound. Following are several Chinese words in their character and Pinyin forms. (The digit following the Roman letters in Pinyin is a tone indicator and may be ignored.)

木	mu4	Tree
花	hua1	flower
人	ren2	Man
家	jia1	home
狗	gou3	dog

Based on the information provided in this chapter, would the location of neural activity be the same or different when Chinese speakers read in these two systems? Explain.

19 Children with specific language impairment have been shown to have particular difficulty with morphemes related to tense, which tend to be omitted from their productions. Make a list of all of the relevant morphemes that express tense in English, and make up a sentence in which this particular morpheme is omitted. You may want to check Chapter 4 to get some help on English morphology.

20 **Challenge exercise:** Do some independent research on one or more of the following topics:

a Consider some of the high-tech methodologies used to investigate the brain discussed in this chapter, such as PET, MRI and MEG. What are the upsides and downsides of the use of these technologies on healthy patients? Consider the cost, the intrusiveness and the ethics of exploring a person's brain, weighed against the knowledge obtained from such studies.

b Recent research suggests that specific language impairment may have a genetic basis. Conduct some research to find out what observations and experimental findings have led researchers to this conclusion. It may be helpful to investigate the websites of senior researchers in this area, such as Mabel Rice and Dorothy Bishop.

c Look up some of the research on the spontaneous emergence of language in individuals with hearing loss who have not had access to language input, such as in Nicaraguan Sign Language or in Al-Sayyid Bedouin Sign Language. At what point does a gestural home sign system become a 'language'? You may wish to read literature by Susan Goldin-Meadow, Ann Senghas and Marie Coppola.

d The former UK prime minister Lady Margaret Thatcher was (famously) quoted as saying: 'If you want something said, ask a man … if you want something done, ask a woman'. This suggests, perhaps, that men and women process information differently. This exercise asks you to take up the controversial question: Are there gender differences in the brain having to do with how men and women process and use language? You might begin your research by seeking answers (try the internet) to questions about the incidence of SLI, dyslexia and language development differences in boys versus girls.

Further reading

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Weblinks

- https://www.youtube.com/user/thelingspace – Fun short introductory videos on language acquisition, psycholinguistics and neurolinguistics.
- http://www.linguisticsociety.org/resource/neurolinguistics – You can learn about how our brains work, aphasia, dyslexia and stuttering.
- https://aphasia.org.au/about-aphasia – At this site you will find information about aphasia and useful links to Australian and overseas aphasia sites.
- http://cnlr.northwestern.edu – At this site you will learn how researchers at the Center for the Neurobiology of Language Recovery of Northwestern University help people with aphasia regain language functionality.
- http://faculty.washington.edu/chudler/lang.html – Interesting information about language and the brain, easy to read!
- http://psychology.about.com/od/historyofpsychology/a/genie.htm – Here you will learn more about Genie's case.
- http://criticalperiodhypothesis.blogspot.com/p/history-of-cph_21.html – This site introduces the history of the critical period hypothesis [CPH], research that supports the existence of the CPH and research that failed to support the existence of the CPH.
- http://ling.umd.edu/neurolinguistics – Gain a better understanding of techniques like MEG, fMRI, EEG or ERP in neurolinguistics research.
- http://www.ruf.rice.edu/~lngbrain/main.htm – All you could want to know about language and the brain, including articles, links and a glossary of important terms.

Endnotes

1 Goldin-Meadlow, S and Mylander, C 1998, 'Spontaneous sign systems created by deaf children in two cultures', *Nature*, *391*: 279–281.

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Part 4

Language and society

> Language is not an abstract construction of the learnt, or of dictionary-makers, but is something arising out of the work, needs, ties, joys, affections, tastes, of long generations of humanity, and has its bases broad and low, close to the ground.
>
> Walt Whitman, *Slang in America,* 1885

9 Language in society

> Language is a city to the building of which every human being brought a stone.
>
> Ralph Waldo Emerson, *Letters and Social Aims,* 1876

Learning objectives

After reading Chapter 9, you should be able to:

- define the term *dialect*, show some of the ways that dialects may be differentiated, and explain how regional and social dialects develop and persist in society
- explain how judgements about language reflect connotations associated with language (based on societal attitudes) rather than characteristics of the language itself
- demonstrate that languages in contact may lead to a range of outcomes, which may help to bridge communication gaps, including the development of pidgins, creoles and entirely new languages
- explain the importance of a thorough understanding of the structure, acquisition and use of language in a wide range of educational settings, including second-language instruction, reading instruction and bilingual education
- understand language as a dynamic and changing system displaying variation at all levels according to the specific context in which the language takes place, including the social setting, the interlocutors, the subject matter and the formality of the situation.

Speakers of English can talk to each other and are pretty good at understanding each other. Yet no two people speak in exactly the same way. Variation in pitch of the voice, loudness, speech rate, voice quality (e.g. whether it is creaky or breathy), the specific production of words and phrases including stress and intonation patterns, word choices and syntactic constructions all combine to give each individual their own unique way of speaking. Some differences are due to age, sex, size, emotional state, or state of health. Other differences may be associated with the context of the speaking situation, the speaker's linguistic heritage, their social, cultural and geographical history, and their social group membership. The unique characteristics of the language of an individual speaker combine to create the speaker's **idiolect**. English may then be said to consist of anywhere from 450 million to upwards of two billion idiolects (or speakers) according to the most generous estimates.

idiolect
Each individual's way of speaking.

Dialects

> A language is a dialect with an army and a navy.
>
> Max Weinreich (1894–1969)

Like individuals, groups of people who speak the same language speak it differently from other groups. Within Australia, people from different parts of the country, from different social and cultural backgrounds, or from different age and gender groups, exhibit variation in the way they speak English (and other languages). When there are systematic differences in the grammar (e.g.

phonology, morphology, syntax) of different groups of people speaking a particular language, we say that the members of each group speak a dialect of the language. Dialects are *mutually intelligible* forms of a language that *differ in systematic ways*. Every speaker, whether rich or poor, regardless of region, cultural or linguistic backgrounds, speaks at least one dialect, just as each individual speaks an idiolect. The various dialects of a language make up the language itself, therefore a language is simply a collection of dialects.

It is not always easy to decide whether the differences between two speech communities reflect two dialects or two languages. Sometimes this rule-of-thumb definition is used: when dialects become mutually *un*intelligible through language change – when the speakers of one dialect group can no longer understand the speakers of another dialect group – the dialects become different languages.

However, this rule of thumb does not always capture how languages are officially recognised, which is instead determined by political and social considerations. For example, Danes speaking Danish, Norwegians speaking Norwegian and Swedes speaking Swedish can converse with each other. Nevertheless, Danish, Norwegian and Swedish are considered separate languages because they are spoken in separate countries and because there are regular differences in their grammars. Similarly, Urdu and Hindi are mutually intelligible 'languages' spoken in Pakistan and India, although in spoken language the differences between them are not much greater than those between the English spoken in the US and the English spoken in Australia or New Zealand.

The recent history of Serbo-Croatian, the language of the former nation of Yugoslavia, illustrates how a particular way of speaking can be considered either a dialect or a language. From a linguistic point of view, Serbo-Croatian is a single Slavic language, even though Croats use Roman script (like English) while Serbs use Cyrillic script (like Russian). In speech the varieties are mutually intelligible, differing slightly in vocabulary, just as British and American English dialects do. However, from a sociopolitical point of view, following the breakup of Yugoslavia in the 1990s, the Serbo-Croatian language 'broke up' as well. After years of conflict, the two now-independent nations assert that they speak not just different dialects but different languages.

On the other hand, linguistically distinct languages in China, such as Mandarin and Cantonese, although mutually unintelligible when spoken, are nevertheless referred to as dialects of Chinese in the media and elsewhere because they have a common writing system that can be read by all speakers (see Chapter 11 for some details of ideographic writing systems) and because they are spoken in a single country.

It is also not easy to draw a distinction between dialects and languages on strictly linguistic grounds. Dialects and languages reflect the underlying grammars and lexicons of their speakers. It would be completely arbitrary to say, for example, that grammars differing from one another by, say, 20 rules represent different languages whereas grammars that differ by fewer than 20 rules are dialects. Why not 10 rules or 30 rules? In reality, there is no sudden major break between dialects. Instead they merge into each other, forming a dialect continuum. Imagine, for example, a traveller journeying from Vienna to Amsterdam by bicycle. Small differences in the German spoken from village to village would be heard, and the people in adjacent villages would have no trouble communicating with one another. Yet by the time our traveller reached Dutch-speaking Amsterdam, the accumulated differences would render the German of Vienna and the Dutch of Amsterdam nearly mutually unintelligible.

Because neither mutual intelligibility nor degree of grammatical difference nor the existence of political or social boundaries is decisive, it is not possible to precisely define the difference between a language and a dialect. We shall, however, use the rule-of-thumb definition and refer to dialects of one language as mutually intelligible linguistic systems with systematic differences among them.

As we will discuss in the next chapter, languages change continually but these changes occur gradually. They may originate in one geographic region or in one social group and spread slowly to others, often over several generations of speakers. When speakers are in regular contact with one another, linguistic properties spread and are acquired by children. However, when communication barriers separate groups of speakers – be it a physical barrier, such as an ocean or a mountain range, or a social barrier of a political, cultural, class, educational or religious kind – linguistic changes do not spread so readily, and the differences between groups may be reinforced and grow in number, leading to dialect diversity. Members of social groups also use linguistic features to symbolise their group membership, enhancing and maintaining the differences with other groups. In this way language can be used to mark solidarity.

dialect levelling
A decrease in variation among **dialects**.

Dialect levelling is the opposite of dialect diversity. It occurs when dialects merge leading to greater uniformity and less variation. The development of Australian English involved dialect levelling in the early stages of the new dialect. Although one might expect dialect levelling to occur as a result of the ease of travel and mass media, this is not necessarily the case. Dialect variation is often maintained because it serves an important social function. There may actually be greater dialect variation in urban areas, where different groups attempt to maintain their distinctness and sociocultural group identity.

Regional dialects

> Phonetics … the science of speech. That's my profession … [I] can spot an Irishman or a Yorkshireman by his brogue. I can place any man within six miles. I can place him within two miles in London. Sometimes within two streets.
>
> Henry Higgins in George Bernard Shaw, *Pygmalion*, 1912

Dialectal diversity tends to increase proportionately to the degree of communicative isolation. *Communicative isolation* refers to a situation such as existed between Australia, the British Isles and North America in the eighteenth century. American, New Zealand, British and Australian English dialects are regional dialects of English. Historically, there was some contact through commerce and immigration, but an American was much less likely to speak to an Australian than to another American. Today the isolation is less pronounced because of the mass media and air travel, but even within a single country, a certain degree of isolation persists between regions and it is common to find regional dialects, particularly in those countries with long histories of continuous settlement, such as Britain. Another very important aspect of regional dialects is that they reflect cultural identity, which is perhaps why, in this age of mass communication and global interconnections, regional dialects persist and often remain relatively resistant to external influence.

A change that occurs in one region and fails to spread to other regions of the language community gives rise to dialect differences. When sufficient dialect differences of this type accumulate in a particular region (e.g. the city of Liverpool or the south-eastern area of England), the language spoken has its own character and that version of the language is referred to as a **regional dialect**.

regional dialect
A **dialect** spoken in a specific geographical area; see **social dialect**.

Accents

accent (of a speaker)
The phonology or phonetic characteristics (pronunciation) of a specific **dialect**; may be native or non-native.

Accent refers to the phonological and phonetic characteristics that distinguish groups of speakers. A person may be described as speaking English with a French accent, a New Zealand accent, a Canadian accent or so on. Accent conveys phonetic and phonological information about the speaker's dialect and may reveal in what country or what part of a particular country the speaker grew up or to which sociolinguistic group the speaker belongs. The majority of Australians have one of the various Australian accents (but of course a great many Australians may have accents that reflect their personal histories in other countries). Australian accents can be identified according to the particular combination of phonetic characteristics that are common in the speech of people who were born and/or raised in Australia when they speak English.

The term *accent* is also used to refer to the speech of someone who speaks a language non-natively. For example, when a person whose first language is French speaks second language English, they can be described as speaking English with a French accent. A native English speaker may speak second language French with an English accent. In this sense, *accent* refers to phonological influence from the first language on the second or other language.

Occasionally, writers exploit the pronunciation characteristics of regional dialects for humorous effect. The satirical book *Let Stalk Strine* (that is, 'Let's talk Australian'), published in 1965 by an author using the pseudonym Afferbeck Lauder, 'Professor of Strine Studies, University of Sinny', contains a glossary of 'Strine' words and phrases. Amusing respellings are used to suggest characteristics that have traditionally been associated with the Australian accent: particular pronunciation of vowels, considerable elision and assimilation of certain consonants, fusion of syllables and so on. The best-known example from *Let Stalk Strine* is the entry 'Emma Chisit'. This expression is said to have been the author's motivation for writing the book. He describes an incident reported in the *Sydney Morning Herald* on 30 November 1964:

> … while the English writer Monica Dickens was autographing copies of her latest book as they were being bought by members of the public in a Sydney shop, a woman handed her a copy and said 'Emma Chisit'. Thinking that this was the woman's name, Monica Dickens wrote 'To Emma Chisit' above her signature on the flyleaf. The purchaser, however, in a rather more positive voice, said, 'No. Emma Chissit?'.

The woman was asking the author the price of the book: 'How much is it?' In *Emma Chisit* we see the elision of the *h* in *how*, the suggestion of a very broad pronunciation of the diphthong in *how* and a blurring of the boundaries between words.

Interestingly, most of the respellings in *Let Stalk Strine* reflect features that are found to occur in most, if not all, dialects of English and not exclusively in Australian English.

Dialects of English

The seventeenth century saw the beginning of a rapid expansion in the British Empire, one consequence of which was that the English language was exported to a number of areas that later became independent countries, including the US, large parts of Canada, Australia and New Zealand. In other places, including India, Singapore and Nigeria, English would become established as a widely spoken second language.

In all the countries mentioned above, specific regional dialects of English are spoken. Regional dialects tell us a great deal about how languages change, as will be discussed at greater length in Chapter 9. American English, for instance, can be traced to the Europeans who first settled North America in the seventeenth and eighteenth centuries. The early settlers came from different parts of Britain, speaking different English dialects, which resulted in regional dialect differences in the first European colonies.

By the time of the American Revolution, there were three major **dialect regions** in the British colonies that became the US: the Northern dialect spoken in New England and around the Hudson River, the Midland dialect spoken in Pennsylvania, and the Southern dialect (along with some other minor dialects). These dialects differed from each other, and from the English spoken in Britain, in systematic ways.

dialect region
A geographic area defined by the predominant use of a particular language variety, or a particular characteristic of a language variety; see **dialect**.

Changes in the pronunciation of words with an *r* in their spelling can help to illustrate how regional dialects develop. In southern England the dropping of *r* sounds before consonants and at the ends of words (e.g. in *card* and *car*) was occurring as early as the seventeenth century but the process did not become common until the middle of the eighteenth century. During this time words such as *farm*, *farther* and *father* began to be pronounced without any /ɹ/ sounds. By the end of the eighteenth century, *r*-dropping was general in the speech of the early settlers in New England and the southern Atlantic seaboard. Close commercial ties were maintained between the New England colonies and London and families often sent their children to England to be educated, which reinforced *r*-dropping among the population around New England. The *r*-less dialect is still spoken today in Boston, New York and Savannah, Georgia. Other settlers to the US came from different parts of England, where the *r* had been retained, or else they came before *r*-dropping was common in southern England. The *r*-less dialect was also transported from Britain to Australia and New Zealand in the late eighteenth century and explains why Mainstream Australian and New Zealand Englishes do not have *r* sounds before consonants or pauses. There are, however, exceptions to this. For example, in the Southland area and parts of Otago in the far south of New Zealand some residual rhoticity remains and has been attributed to the Scottish settlement of the region which began around the middle of the nineteenth century. The Scottish migrants would have brought Scottish English rhoticity with them and this feature persists in the community today although with decreasing frequency.[1]

English is the most widely spoken language in the world if one counts all those who use it as a native language or as a second or third language. It is the national language of a number of countries, such as Australia, the US, large parts of Canada, the British Isles and New Zealand. For many years it was the official language in countries that were once colonies of Britain, including India, Nigeria, Ghana, Kenya and the other anglophone countries of Africa. Dialects of English are spoken in these countries for the reasons just discussed.

In the following sections we shall examine the primary linguistic parameters that differentiate regional dialects (phonological, lexical and syntactic), before examining Australian English and New Zealand English as dialects of 'World English'.

Phonological differences

In many varieties of North American English the words *Mary*, *merry* and *marry* are pronounced in the same way – they are homophones; in others, such as Australian and New Zealand English, these three words are pronounced with different phonemes as /meːɹiː/, /meɹiː/ and /mæɹiː/. In Australia, the word *castle* is often pronounced /kæsəl/ in Melbourne, but /kɐːsəl/ in Sydney. Similarly, the word *celery* may be confused with *salary* in Melbourne but not in Sydney where the two words are quite distinct. The celery/salary (/el/–/æl/) merger that occurs in Melbourne English (and other varieties of English, such as New Zealand English and White South African English) has been carefully described by Loakes and colleagues.[2] In this merger the vowel /e/ changes to /æ/ before /l/ in words like *elf*, *pellet*, *melody* forming homophones with *Alf*, *palate*, *malady*. Another example of a merger occurs for the vowels in words like *hear* and *hair* for some speakers of New Zealand English. These words become homophones for such speakers due to the vowel merger but remain distinct in Australian English where the merger has not occurred.

The vowel in *dance* is an interesting example illustrating the relationship between regional variation and language change. In most varieties of Australian and American English the /æ/ vowel is used so that *dance* rhymes with *ants.* This is because the word was imported to those countries from Britain before the late 18th century when /æ/ was typical in the pronunciation of the word. During the 19th century the vowel in *dance* was gradually replaced in many parts of Britain with a long vowel to rhyme with *aunts*. British colonies established during this period, such as New Zealand, reflect the phonology of the settler populations who used the long vowel. In Australia, the *aunts* vowel in *dance* is most common in South Australia which was settled at a similar time to the settlement in New Zealand.[3]

As mentioned earlier in this chapter, British and American English varieties differ in systematic ways. For example, general American English is typically rhotic, allowing the phoneme

/ɹ/ to occur in all syllabic positions, whereas most varieties of British English, Australian English and New Zealand English are typically non-rhotic as /ɹ/ can only occur before vowels. This means that the words *father* and *farther* are homophones in a non-rhotic accent (i.e. these words would not contain any *r* sounds) but pronounced differently in a rhotic accent where *father* would only have an *r* sound at the end of the word and *farther* would have *r* after the first vowel and also at the end of the word. Of course there are always exceptions to any generalisation like this. There are some non-rhotic American English accents, such as those that occur around the Boston area. Non-rhoticity is also common in African-American English (AAE). Conversely, some British English accents, particularly in Scotland and the West Country, are rhotic, as are some speakers from New Zealand's Southland as mentioned above. Another difference between American English on the one hand and British, Australian and New Zealand English on the other is referred to as *yod dropping*. Yod dropping is the deletion of /j/ after alveolar consonants such as /t/, /d/ and /n/. Most varieties of British, Australian and New Zealand English do not delete /j/ in words like *news* or *stupid* but American English does. There are also differences in stress patterns for words in different varieties of English. For example, in polysyllabic words like *cigarette*, *controversy* and *laboratory* Americans often place stress on the first syllable but British, Australian and New Zealand speakers often stress the second or third syllable in these words.

Lexical differences

Regional dialects may differ in the words people use for the same object, as well as in the way they pronounce words. People take a *lift* to the *first floor* in Australia, but an *elevator* in the US; they fill up with *petrol* in Sydney and London, but *gas* in Los Angeles; in Australia and New Zealand you have to pay to attend *private schools*, but in Britain these are called *public schools*; a *freeway* in (most of) the US is a *motorway* in Britain, while both terms are found in Australia. The word for rubber sandals with Y-shaped strap between the big toe and second toe is *jandals* in New Zealand, *thongs* in Australia and *flip-flops* in Britain.

Lexical differences also occur within countries. In Australia there are lexical differences from state to state; for instance, deep fried battered potato snacks are known as *scallops* in New South Wales and *potato cakes* in Victoria; the sandwich spread called *peanut butter* in New South Wales is *peanut paste* in South Australia and Queensland. *Swimmers* in NSW are sometimes called *togs* in Queensland. The map in Figure 9.1 from the Linguistic Roadshow website shows the Australian lexical regional variation in the words used for items of clothing worn for swimming based on a survey of over 20,000 respondents.

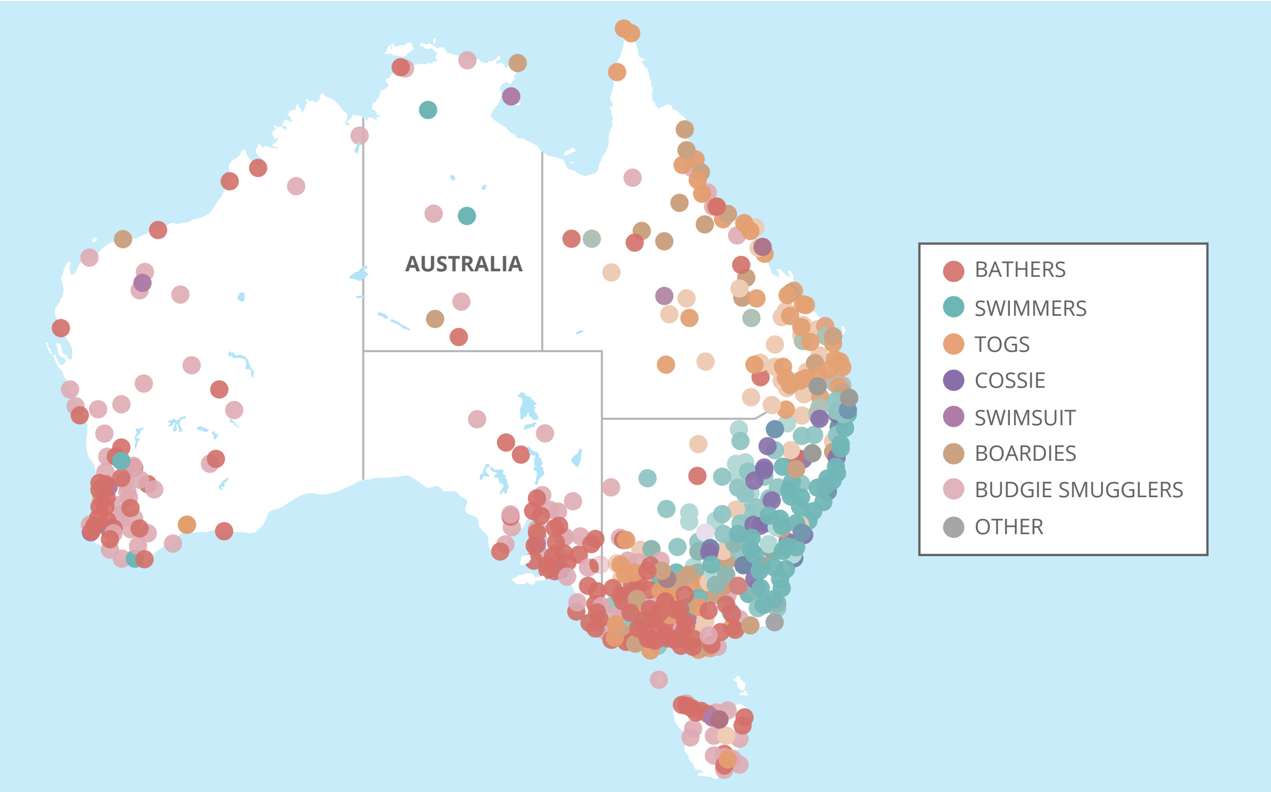
Syntactic differences

Dialects can also be distinguished by systematic syntactic differences. In some English dialects, the pronoun *I* occurs in expressions such as *between you and I* and *Won't he let you and I swim?* when *me* would be used in other dialects. This is a syntactically conditioned morphological difference. Some American English dialects allow 'double modals' as in *He **might could** do it* or *You **might should** go home*. In British English the pronoun *it* in the sentence *I could have done it* can be deleted, yielding *I could have done*, but this contravenes the syntactic rules of Australian English, which requires the deletion of *done* as well (*I could have*).

There are some syntactic features which, although not restricted to Australian usage, are far more commonly encountered in that dialect than elsewhere. One of these is the use of the present perfect (*has/have*) in past time contexts where it occurs with a definite past-referring adverbial (*then*), such as in *Then he's hit her on the head*. Another is the use of *but* in sentence-final position, as in *It wasn't very interesting but*.[4] These are commonly referred to as syntactic features of (spoken) Australian usage.

Despite such differences, we are still able to understand speakers of other English dialects. Although regional dialects differ in phonology, lexical aspects and syntax, the differences are

Figure 9.1 **Map of Australian lexical regional variation for swimwear**



minor when compared with the totality of the grammar. Dialects typically share most syntactic rules and vocabulary, which explains why the dialects of a language are mutually intelligible.

Australian English

> The children born in those colonies, and now grown up, speak a better language, purer, more harmonious than is generally the case in most parts of England. The amalgamation of such various dialects assembled together, seems to improve the mode of articulating the words.
>
> James Dixon (1822) Narrative of a voyage to New South Wales and Van Diemen's Land in the ship *Skelton* during the year 1820

English came to Australia permanently in 1788 with the arrival of the First Fleet and the establishment of the British penal colony. At that time, Australia was rich in the cultural and linguistic diversity of the Aboriginal and Torres Strait Islander peoples who had inhabited the continent for over 40 000 years. It is estimated that more than 300 languages from around 30 language families were spoken at the time of colonisation. European settlement had a catastrophic impact on the lives of the First Australians including the decimation of culture and language, and it is against this historical context that the emergence of Australian English must be situated.

The development of Australian English bears some similarities to that of American English. However, European Australia was not settled by waves of immigration over such an extended period, and was not subject to such a variety of linguistic influences in the early days of the settlement. As a result, Australian English is more homogeneous than American English. This uniformity is all the more remarkable when one considers the vast reaches across which it is spoken. The distance from Sydney to Perth is more than 3000 kilometres, yet it is almost impossible to distinguish the accents of people from the two cities. Regional differences in phonology and lexis of the type noted above are encountered, but they are limited.

How did this relative regional uniformity of spoken English in Australia come about? Part of the answer lies in the carrying forward of trends already present in the popular accents of the southeast of England in the late eighteenth and early nineteenth centuries, However, it is the dialect mixing and levelling effect, which was a feature of the early European settlement of Australia, that is generally regarded as the most important factor. The first British colonists settled in Sydney and it was here that the new dialect emerged in the speech of the non-Indigenous English-speaking children born into the new colony. They amalgamated the various dialects that they heard around them in the creation of their own local variety with a uniquely different accent from that of their parents and older members of the community. The new dialect quickly spread from Sydney as settlements were established around the country, particularly in a number of seaports. A heterogeneous mixture of regional and social dialects from almost every British county existed in these settlements but there was a particular bias towards London English, since about one-third of the convict population was from the London area. Across the Tasman in New Zealand, the same mixing and levelling process of similar input dialects took place about 50 years later, with the result that the Australian and New Zealand accents of today share many similar characteristics.

Although there is relatively little regional variation in Australian accents, this should not be taken to mean that there is no variation in speech patterns in Australia. Wherever English is spoken in Australia, one finds a range of different varieties, or styles, of production. We can broadly categorise Australian English into three main types: mainstream, ethnocultural and Indigenous Australian.

The traditional way to describe the mainstream Australian accent variation is to distinguish varieties along a continuum from *Broad* through *General* to *Cultivated*. These categories were first defined in the 1960s by Mitchell and Delbridge in their book *The Speech of Australian Adolescents*.[5] However, there have been many changes to Australian English since the three accent types were identified and it is clear that there are fewer speakers of Cultivated and Broad Australian English today. In addition, considerable new variation has entered the dialect, much of which may be related to increased linguistic and cultural diversity in the community.

When discussing these three broadness varieties it is important to acknowledge that dividing Australian accent variation into Broad, General and Cultivated does not adequately reflect the range of variation in present day Australian English because it is based on an Anglo-centric model of variation. Although the phoneme inventory of all three broadness varieties is identical, there are differences in the phonetic realisation of certain vowel phonemes, particularly, those found in the words *beat*, *boot*, *bait*, *boat*, *bite* and *bout*. In Cultivated Australian, most vowels are reminiscent of Southern Standard British English. In Broad Australian, those characteristics that are generally perceived as being quintessentially Australian are most marked. Its speakers tend to embrace assimilation and elision, more so than do speakers of General and Cultivated varieties. General Australian, the most widely represented variety, lies between the other two. The phonetic realisations of the six phonemes, as mentioned earlier, display variation from variety to variety.

One pervasive characteristic differentiates Australian English (and also New Zealand English) from many other English varieties. This is the strong tendency to use the schwa vowel /ə/ in unstressed syllables. Therefore, in the following pairs of alternative pronunciations, Australian English speakers would use the latter:

perhaps	/pɜːˈhæps/	/pəˈhæps/
roses	/ˈɹəʉzɪz/	/ˈɹəʉzəz/
patches	/ˈpætʃɪz/	/ˈpætʃəz/

One consequence of this tendency is that Australian English has a considerable number of homophones that do not occur in most other English accents. Compare:

	Australian English	British English (RP)	(Standard) American English
tended/tendered	/ˈtendəd/tendəd/	/ˈtendɪd/ˈtendəd/	/ˈtendɪd ~ ˈtendəd/ˈtendəɹd/
rashes/rashers	/ˈɹæʃəz/ˈɹæʃəz/	/ˈɹæʃɪz/ˈɹæʃəz/	/ˈɹæʃɪz ~ ˈɹæʃəz/ˈɹæʃəɹz/

Confusion may result between speakers of one dialect and those of another. It is reported, for example, that an Australian newsreader who worked in British television for a time gave rise to complaints over his apparent announcement that during an electricity breakdown, a hospital had to continue with the use of 'tortures' (i.e. *torches*).

Australia is one of the most ethnically diverse countries in the world, with nearly half of the population (49%) either born overseas or the child of at least one parent who was born overseas. Yet we are still learning about the speech patterns of culturally and linguistically diverse Australians (including Indigenous Australians) and how language is used to express cultural heritage. As is the case for all speakers of any language or dialect, Australians vary their accent according to social and stylistic circumstances.

Australian English is characterised by a distinctive vocabulary, as well as accent. It is widely felt that this distinctiveness resides in the rich and creative slang vocabulary for which Australians are famed. However, the greater part of our vocabulary is typical of English generally, and gains its Australian character mainly from the meaning shifts that occurred when conventional English terms were reapplied in the novel Australian environment. As early as 1805, it was noticed by Governor King that the meanings of words as common as *brush*, *scrub*, *creek* and *lagoon*, which had been applied to features of the unfamiliar Australian landscape, called for redefinition. In finding labels for the new flora and fauna that they came across in Australia, the settlers typically looked for resemblances with English species: accordingly, words such as *apple tree*, *cedar*, *honeysuckle* and *swamp pheasant* were brought into use, even though the plant or animal denoted was in most cases unrelated to its English original and would have already had names in the local language of the Aboriginal inhabitants. Other words were used at first in their established English meanings (e.g. *station*, *muster*, *superintendent*) as part of the vocabulary associated with the convict system but were subsequently applied to aspects of pastoral management.

The resources of the vocabulary were augmented as well by borrowing. In the pre-goldrush colonial period, a number of words were borrowed from Aboriginal languages, but were generally limited to labels for flora, fauna and environmental features. Many words were borrowed from the Dharuk language spoken around the area of Sydney, such as *dingo* (1789) and *koala* (1798).[6] The goldmining period brought a wave of borrowings from American English, mainly miners' terms that had come into use on the Californian goldfields, including *prospect*, *digger* and *dirt*.

More importantly, perhaps, the gold rushes of the mid-nineteenth century saw an influx of people from all walks of life who, joined in a common mission and essentially free of the social restraints of the early colony, ushered in a period that saw colloquial aspects of the vocabulary expand rapidly.

From the earliest times, the vigorous colloquial element in the Australian vocabulary has attracted the attention of visitors. Much of the colloquial speech of the early convicts was *flash language*, urban slang associated particularly with prison contexts and originating in London, for example, *cove*, *swag* and *trap* (a policeman). Also forming a significant part of the colloquial word stock were British regional dialect words, such as *barrack*, *dinkum* and *cobber*.

From about the period of the gold rushes, the vocabulary began to rely less and less on words transported from Britain and more on expansion from its own or local resources. With the increasing facility of worldwide travel and ease of communication, isolation became a thing of the past and the vocabulary began to take on more of a worldly flavour. Nevertheless, there is a rich body of words and expressions whose distinctive flavour justifies their classification as Australianisms. In many Australian idioms, one can detect a wryly ironic, humorously euphemistic streak exemplified by phrases like: *mad as a cut snake*, *what do you think this is – bush week?*, *flat out like a lizard drinking*.

One element of Australian morphosyntax that is distinctive is the productive use of hypocoristics. **Hypocoristics** are forms derived from taking the first part of a word and adding a diminutive suffix. Such forms are in common use in Australia, particularly those created by the suffixes *-ie* and *-o,* as in *cossie* for 'swimming costume', *mozzie* for 'mosquito', *brekkie* for 'breakfast', *servo* for 'service station', *avo* for 'avocado', and *arvo* for 'afternoon'. The Australian hypocoristic *selfie* was awarded word of the year by Oxford Dictionaries in 2013. Most Australians would know exactly which fast food chain you were referring to if you said you were heading to Macca's. The COVID-19 pandemic spawned a whole range of new Aussie slang terms, such as *iso* (isolation), *the Rona* (coronavirus), *sanny* (hand sanitiser).

hypocoristic
A shortened form of a word – used particularly in Australian slang and often ending in 'ie' or 'o' as in *mossie* for *mosquito* or *ambo* for *ambulance officer*.

New Zealand English

In New Zealand, the English language became established along with the permanent European settlement before the middle of the nineteenth century and not long after the establishment of Australian English. The New Zealand and Australian accents are, despite some phonetic differences, quite similar, and outsiders may have difficulty distinguishing between them. In New Zealand, as in Australia, there is a geographically relatively homogeneous spectrum of mainstream accent varieties ranging along a broadness continuum. The most striking phonetic difference between the Australian and New Zealand accents concerns the short vowel that occurs in words like *kit* and *miss*. In New Zealand English this has become a central vowel, not too distinct from schwa /ə/. The phonetic symbol for the New Zealand vowel is the upside-down schwa [ɘ]. The occurrence of this schwa-like vowel is not restricted to unstressed syllables as schwa is in Australian English. The following typical New Zealand pronunciations show this: *invincibility* [ɘ̃nvɘ̃nsəbɘɫəti:], *distinctive* [dəstɘ̃ŋktəv].

Several other vowel differences occur between the two national accents. The short front vowels /æ/ (as in *pat*) and /e/ (as in *pet*) are phonetically higher in New Zealand English, so that an Australian ear may hear a New Zealander's pronunciation of *that bed* as [ðet bɪd]. The centring diphthong in the word *hair* has a phonetically higher starting position in New Zealand English, so for many New Zealanders *rare* and *rear*, *pear* and *pier*, *bare* and *beer* are homophonous, pronounced [ɹɪə], [pʰɪə] and [bɪə] respectively. Some New Zealanders, but few Australians, retain the opposition that was made consistently until quite recently in some varieties of British English between *which* [ʍɪʧ] and *witch* [wɪʧ]. [ʍ] is the voiceless labiovelar fricative whereas [w] is the voiced labiovelar approximant.

When we turn to the vocabulary of New Zealand English, once again we find the resemblances with Australian English more striking than the differences. Links between the two countries have always been close. In the early days of sealing and whaling, New Zealand was part of Australia's area of operations, and later on, when New Zealand had become more settled, Australian sheep farmers began to cross the Tasman. The gold rushes brought a further wave of Australians.

The consequences that these close early links had for the vocabulary were summarised by George Turner in 1970:

> Before the Federation of Australia, which excluded New Zealand, it was perhaps only the influence of Māori in its vocabulary, especially to name local plants and birds, that would have justified distinguishing New Zealand English from the slightly differing and interacting varieties of English used in the mainland colonies of Australia and in Tasmania. Even now the similarities in pronunciation and older vocabulary suggest a single dialect area with two major subdivisions ... [7]

The extensive vocabulary, connected with the land, that grew up in nineteenth-century Australia had its counterpart in New Zealand with words such as *bush*, *creek* and *gully* differing only in their particularly local associations. In the informal vocabularies of the two countries we find many parallels. Appellative terms, such as *Pommy*, *wharfie*, *joker*, *sheila* and *wowser*; epithets, such as *crook* (ill) and *mad* (angry); and intensives, such as *too* (as in *too right*) and *fair* (as in *fair cow*), are common to both. There are, however, minor variations in common words and expressions. A *weekender* in Australia is a *bach* in New Zealand, a *milk bar* is a *dairy*, and *hiking* is referred to as *tramping*. Australian *rough as guts* is *rough as sacks* in New Zealand, *fair dinkum* has become *feather dinks* and *to be in strife* is more usually *to be in the cart*.

The contribution of the Māori language to the general English vocabulary in New Zealand has tended to be restricted to names for flora, fauna, the natural environment and customs. Māori placenames are extensive and there are many examples of dual Māori/English placenames, such as Aoraki/Mt Cook and Matiu/Somes Island. Some Māori words that have become entrenched in the general vocabulary are *kiwi*, *Pākehā* (European New Zealander), *wahine* (woman) and *kia kaha* (be strong). In the 1970s, revitalisation of Māori started to take shape, particularly as New Zealand began to position itself as a South Pacific nation with looser ties to Britain. Important effects in Māori revitalisation were felt through the Māori Language Commission established under the Māori Language Act in 1987. The act declared Māori as an official language of New Zealand and since that time there have been successes in promoting the use of Māori in education, in public life and in the media. In 2016 the New Zealand parliament passed *Te Ture mō Te Reo Māori 2016* (*The Māori Language Act 2016*). This bill established Te Mātāwai to oversee the Māori language revitalisation on behalf of the Māori people. Importantly, the bill was written in both te reo Māori and English, with primacy given to the Māori text.

Social dialects

> The limits of my language mean the limits of my world.
>
> Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, 1922

In many respects, social boundaries and class differences are as confining as the physical barriers that often define regional dialects. It is therefore not surprising that different dialects of a language evolve within social groups. Communication within a particular group is free and unconstrained, as it is in a particular region. Communication among social groups may, however, be as severely limited as if a physical boundary, such as an ocean, existed between them.

The social boundaries that give rise to dialect variation are numerous. They may be based on socioeconomic status, ethnic or racial differences, country of origin and even gender. Middle-class Australian English speakers are sometimes distinguishable from working-class speakers; speakers of Australian Aboriginal and Torres Strait Islander descent may speak a different dialect from those of European descent in Australia; in Baghdad the Christian, Muslim and Jewish groups speak different varieties of Arabic; in India people often use different dialects of a standard regional language, such as Hindi, Gujarati or Bengali, depending on the social caste they belong to; in the US, many speakers of African descent speak a different English dialect than those of European, Asian or Hispanic descent; and, as we shall see, women and men each have their own distinguishing speech characteristics.

Dialect differences that seem to come about because of social factors are called **social dialects** (sociolects), as opposed to regional dialects, which are due to geographical factors; but there are regional aspects to social dialects and, clearly, social aspects to regional dialects, so the distinction is not entirely clear cut.

social dialect
A **dialect** spoken by a particular social group; also referred to as sociolect.

The standard

> We don't talk fancy grammar and eat anchovy toast. But to live under the kitchen doesn't say we aren't educated.
>
> Mary Norton, *The Borrowers*, 1952

Even though every language is a composite of dialects, many people talk and think about a language as if it were a well-defined and standard system with various dialects diverging from this norm. This is false, although it is a falsehood that is widespread. One writer accused the editors of *Webster's Third New International Dictionary*, published in 1961, of confusing

> 'to the point of obliteration the older distinction between standard, substandard, colloquial, vulgar, and slang', attributing to them the view that 'good and bad, right and wrong, correct and incorrect no longer exist'.[8]

In the next section we argue that such criticisms are ill founded.

Language purists

> A woman who utters such depressing and disgusting sounds has no right to be anywhere – no right to live. Remember that you are a human being with a soul and the divine gift of articulate speech: that your native language is the language of Shakespeare and Milton and the Bible; and don't sit there crooning like a bilious pigeon.
>
> Henry Higgins in George Bernard Shaw, *Pygmalion*, 1912

Prescriptive grammarians, or language purists, usually consider the dialect used by political leaders and national newscasters as the correct form of the language. (See Chapter 1 for a discussion of prescriptive grammars.) This is the dialect taught in 'English' or 'grammar' classes in school and it is closer to the written form of the language than many other dialects, which also lends it an air of superiority.

Otto Jespersen, the great Danish linguist, ridiculed the view that a particular dialect is better than any other when he wrote:

> 'We set up as the best language that which is found in the best writers, and count as the best writers those that best write the language. We are therefore no further advanced than before'.

The dominant, or prestige, dialect is often called the standard dialect. In Australia it is referred to as Standard Australian English (SAusE) (more often now referred to as Mainstream Australian English). SAusE is an idealisation that is difficult to define precisely. It was at one time said to be typified by the language that national news broadcasters use, but the problem with this today is that many broadcasters use a range of different dialects and styles of English. For example, the British Broadcasting Corporation (BBC) once used mostly speakers of RP English, but today speakers of Irish, Welsh, Scottish and other regional dialects of English are commonly heard on

BBC programs. In Australia, changing social conventions have also seen a rise in the variety of accents and dialects used in the media.

The idea that language change equals corruption goes back at least as far as the Greek grammarians in Alexandria (200–100 BCE) who were concerned that the Greek spoken in their time was different from the Greek of Homer and believed that the earlier forms were purer. They tried to correct the imperfections but failed as miserably as do any modern counterparts. No academy and no guardians of language purity can stem language change since such change does not mean corruption and is simply a consequence of language in use.

A standard dialect of a particular language may have social functions. Its use in a group may serve to bind people together or to provide a common written form for multidialectal speakers. No dialect, however, is more expressive, less corrupt, more logical, more complex or more regular than any other dialect or language. They are simply different. Any judgements, therefore, as to the superiority or inferiority of a particular dialect or language are social judgements, which have no linguistic or scientific basis.

To illustrate the arbitrariness of linguistic prestige, consider the English pronunciation of the word *dance* as previously discussed. This word is pronounced with an [æ] vowel in American English and this is the common pronunciation in Australia as well (i.e. *plant* rhymes with *ant*). However, in New Zealand and in Southern England the vowel in the word *car* is used instead (i.e. *plant* in these varieties rhymes with *aunt*). For many Australians, the Southern British English latter version is often seen as the prestigious pronunciation. This is because for a long time Southern Standard British English was considered the external standard for Australian English. Interestingly, in 1791 John Walker published his *Critical Pronouncing Dictionary*, which became highly influential during the nineteenth century. He suggests that pronouncing the vowel in words like *plant* with a long vowel as in *car*, as opposed to [æ],

> 'borders very closely on vulgarity'.[9]

This observation illustrates that there is nothing inherent in linguistic structures that render them prestigious and that social connotations can change over time.

Language oppression

Language purists wish to stem change in language or dialect differentiation because of their false belief that some languages are better than others or that change leads to corruption. Languages and dialects have been banned as a means of political control. Russian was the only legal language permitted by the tsars, who banned the use of Ukrainian, Lithuanian, Georgian, Armenian, Azeri and all the other languages spoken by national groups under the rule of Russia.

In Australia, Aboriginal and Torres Strait Islander languages have been actively discouraged by oppression, genocide and strong pressure on their speakers to 'assimilate': However, there have been attempts in recent decades to initiate language maintenance and revitalisation programs in Australia.[10] For many years, Native American languages were banned in federal and state schools on reservations. Speaking Faroese was formerly forbidden in the Faroe Islands. A proscription against speaking Korean was imposed by the Japanese during their occupation of Korea between 1910 and 1945 and, in retaliation, Japanese movies and songs were once banned in Korea.

In 1903, the use of Māori was banned as the language of instruction in native schools in New Zealand, leading to the growth of English amongst the Māori population. This policy of monolingual English education contributed to dramatic language loss and by the 1970s Māori was critically endangered and fluent speakers of Māori were few. However, by 1995 the tide had turned and even though English was the dominant language spoken in the Māori community, more Māori language was being used by the younger generation under the age of 15. This language regeneration came about through young adults learning the language at university, but importantly through two Māori-led initiatives. Te Kohanga Reo was an initiative to encourage grandparents to teach their grandchildren Māori language, and Kura Kaupapa Māori was the establishment of Māori language immersion schools that aimed to further strengthen Māori language and culture among the children and their communities, and encourage participation in all levels of New Zealand society, both Pākehā and Māori.

In France, a notion of the 'standard' (the dialect spoken in Paris) as the only correct form of the language is promoted by an official academy of scholars who determine what usage constitutes the official French language. A number of years ago, this academy enacted a law forbidding the use of 'Franglais'; that is, words of English origin, such as *le parking*, *le weekend* and *le hotdog*. The French, of course, continue to use them, and since such words are notorious, they are widely used in advertising, where being noticed is more important than being 'correct'. Only in government documents can these proscriptions be enforced.

In the past (and to some extent in the present), a French citizen from the provinces who wished to succeed in French society nearly always had to learn the prestigious Parisian French dialect. Then, several decades ago, members of regional autonomy movements demanded the right to use their own languages in their schools and for official business. In the section of France known as l'Occitanie, the popular singers sing in Langue d'oc, a Romance language of the region, both as a protest against the official language policy and as part of the cultural revival movement.

In many places in the world, the use of sign languages of the deaf as languages of instruction in schools was banned. Children in schools for the deaf, where the aim was to teach them to read lips and to communicate through sound, were often punished if they used any gestures at all. This view prevented early exposure to language. It was mistakenly thought that children, if exposed to sign, would not learn to read lips or produce sounds. Individuals who become deaf after learning a spoken language are often able to use their knowledge to learn to read lips and continue to speak, but this is very difficult if one has never heard speech sounds. Furthermore, even the best lip readers can comprehend only about one-third of the sounds of spoken language. Imagine trying to decide whether *lid* or *led* was said by reading the speaker's lips. Mute the sound on a television or computer and see what percentage of a news broadcast you can understand, even if recorded and played back in slow motion, and even if you know the subject matter.

Although a standard dialect is in no linguistic way superior, there will always be those members of the community who feel compelled to try to uphold the 'purity' of language including in Australia. It is reported that in 1971 a kindergarten teacher in Sydney had each of her pupils write the word *got* on a card. Then teacher and class proceeded with the cards to the playground where a hole was dug and the cards ceremoniously buried. This teacher's actions represent a somewhat colourful contribution to a long tradition of denunciation of *got* among teachers and writers of usage handbooks. Partridge, for instance, in his book *Usage and Abusage*, attacks the 'too frequent slovenly substitution of *got* for other words'.[11] While one may be sympathetic to calls for more colourful and precise expressions in formal styles, it makes no sense trying to abolish *got* in informal contexts, where its use is firmly entrenched.

A difficulty faced by those who wish to dictate the correct forms of words and syntax is that it is not always clear which forms are correct. To those brought up on traditional grammar, for example, there is little doubt that *me* rather than *I* is the correct pronoun in phrases as *between you and me* (because in English prepositions are said to govern the accusative case). *I*, however, occurs quite frequently, especially in formal situations. One possible explanation for this is that speakers may be aware of normative prescriptions against *me* in constructions such as *It is me* and *You and me should go*, and therefore will tend to regard it as incorrect in other constructions.

On the whole, people in Australia tend to be less linguistically conservative than those in Britain and the US and more tolerant towards traditionally proscribed usages such as *than me*, *are a number of*, *different to*, and *criteria* and *data* used as singular forms. Space limitations prevent treatment of the issues involved in all of these, but let us look briefly at the last.

Criteria and *data* are members of a small set of nouns in English (also including *media*, *strata*, *phenomena* and *curricula*) borrowed from Latin or Greek. Strictly speaking etymologically, they are plural forms, but for various reasons (one being the analogical support provided by singular nouns ending in *-a*, such as *propaganda*, *persona* and *replica*) their singular forms (*criterion*, *datum*, *stratum*, *phenomenon* and *curriculum*) have become comparatively rare and they are now treated by the majority of speakers as singular. The problem is that language changes, but such change does not amount to corruption. Those who pronounce against such usages (Follett, for example, in his book *Modern American Usage*, refers to the singular use of *data* as singular as 'an outrage'[12]) may have some small effect in slowing down the process of change, but they have little chance of actually preventing it.

Attempts to ban languages and dialects are countered by the efforts of certain peoples to preserve their languages and cultures. In Ireland and Northern Ireland, Gaelic (or Irish), is being taught again in hundreds of schools; there are numerous first-language learners of this once-moribund language.

Australian Aboriginal and Torres Strait Islander English

> I think that's why a lot of blacks don't try to speak better because … sometimes other blacks'll laugh at them.
>
> Extract from interview reported in Eagleson et al., *English and the Aboriginal Child*, 1982

The linguistic situation of Aboriginal and Torres Strait Islander people today reflects the legacy of two centuries of disruption to traditions and practices brought about by the ignorance and hostility of the dominant European society in Australia. In recent years, Australia has seen the emergence of a greater understanding and appreciation of Australian Aboriginal and Torres Strait Islander cultural values, reflected both in government policies and in community attitudes. The distressing truth remains though that of the estimated 300 pre-contact languages, only a handful remain in general use by a community of speakers. In the southern regions, where Europeans settled in great numbers, Aboriginal traditional life had all but disappeared by the end of the twentieth century, and English (in a variety of forms) came to be the most commonly used language among the Aboriginal peoples.

By contrast, in the desert areas and tropical north, remoteness and the much-reduced European population made possible a maintenance of Aboriginal and Torres Strait Islander cultural and linguistic traditions. Even here, though, the pressure to communicate in towns, outposts, pastoral properties and mission stations made it necessary for a common medium of communication to be found. Not surprisingly, given the inequality in the relationships between Europeans and Aboriginal and Torres Strait Islanders, it was a pidginised form of English (see 'Contact languages: pidgins and creoles' later in this chapter) that was to emerge in response to this need. Two separate creoles have developed in Australia. One is derived from the Pacific Pidgin English and is spoken in the Torres Strait Islands. The other, known as Kriol, is spoken from the Kimberley through to the Queensland Gulf country. These two creoles are legitimate languages with complex rule-governed grammatical systems. In Australia today there is a spectrum of English used by Aboriginal and Torres Strait Islanders, ranging from a form similar to the creoles at one end to Mainstream Australian English at the other, but this does not prevent speakers from moving in one or the other direction along the scale as the occasion demands. Those speakers who use the forms closer to Mainstream Australian English are said to use **acrolectal** varieties. The forms closer to the creole or native Indigenous languages reflect **basilectal** varieties. The term *Australian Aboriginal English* or *Aboriginal English* is used to refer to those speech varieties that occupy the spectrum between these two points. There are many varieties of Aboriginal English and these vary according to the particular speech community in which they are used. Community-specific labels, such as 'Woorie Talk' (used in Woorabinga, Queensland) and 'Yarrie Lingo' (used in Yarrabah, Queensland), make explicit the relationship between English language and place.

acrolect
A prestigious variety of a language.

basilect
A less prestigious variety of a language.

Visit https://aiatsis.gov.au/explore/map-indigenous-australia to view an interactive map of Aboriginal and Torres Strait Islander Australia, which indicates the rich diversity of Aboriginal and Torres Strait Islander languages in Australia.

Most Aboriginal and Torres Strait Islander people (including those who reside in the major urban areas) speak a variety of English similar to Mainstream Australian English. The differences between Mainstream Australian English and Aboriginal English are more pronounced in the basilectal varieties. In basilectal varieties, grammatical differences from standard verb morphology are found, such as double degree marking with adjectives, multiple negation and so on. Omission of the verb *to be*, use of a falling intonation on a declarative structure plus a tag such as *eh?* to indicate a question, and non-marking of the present-tense, third-person singular (e.g. My brother say we can go) may also be found. A full account of the grammatical structure of Aboriginal English is beyond the scope of this book, but Meakins and O'Shannessy (2016) and Malcolm (2018) provide further information, the details of which can be found in the 'Further reading' section.

There are some features of pronunciation that, though not unique to Aboriginal English, are certainly quite common. These include the substitution of the phonemes /f/ and /v/ for /θ/ and /ð/ respectively (e.g. earth /ɜːf/, leather /levə/), and dropping of /h/. In basilectal varieties there are also influences from Aboriginal languages that typically do not have a voicing distinction for stop consonants. Initial stops appear voiced, as do those between vowels, but final stops are devoiced. This means that it is possible for words like bought, port, board, poured to sound the same.

Another striking feature of some varieties of Aboriginal English that distinguishes them from Mainstream Australian English, is the lack of a dark /l/ (see Chapter 2 for details of dark /l/ in Australian English). Also distinctive is the use of words from local Aboriginal and Torres Strait Islander languages, such as koori, 'Aboriginal'; gubba, 'white person'; and muk-muk, 'spirit', and English words with extended meaning, such as *deadly* meaning 'awesome'. One area that is very distinctive is kin terminology, which expresses important social values and illustrate the importance of relationships and respect. For example, kinship terms *bro, sis, cuz* express close connections between nonfamily members, and the use of terms such as *aunty* and *uncle* for older community members show respect to older generations.

The Aboriginal English varieties show a range of influence from Australian Languages, including lexical, phonological, syntactic and pragmatic effects (see Butcher, 2008 and also O'Shannessey and Meakins, 2016 for a discussion of Australian Language contact varieties, including Aboriginal English). Aboriginal English has the important social function of fostering in-group identity and solidarity.

It bears repeating that Aboriginal English serves all the needs required of it by its community. It should never be considered a corrupt or illogical variant of English, but rather is governed by rules no less regular than those of the standard. For instance, many Aboriginal and Torres Strait Islander speakers in country and remote areas omit the plural suffix *-s*. This most consistently occurs when the notion of plurality is already indicated by some other word in the sentence, such as *many*, *two* or *alla*: *two big turtle*, *shooting alla bird*. These speakers avoid the redundant number marking that occurs in such noun phrases in Mainstream Australian English.

Ethnolects

Dialects are defined in terms of groups of speakers, and speakers are most readily grouped by geography. There's little confusion in seeing that people live in Australia, Britain or the US and speak Australian, British or American English dialects. Regional dialects are the most apparent and generally are what people mean when they use the word 'dialect'. Social groups are more amorphous than regional groups, and social dialects are correspondingly less well delineated and, until recently, less well studied.

Within Australia there are many people of non-Anglo immigrant backgrounds who use varieties of Australian English sometimes referred to as 'ethnolects'.[13] Ethnolects reflect the relationship between English and the heritage language of their users and display varying levels of influence from these languages. They are most frequently used in the home domain with parents and grandparents, sometimes in conjunction with a language other than English, and signal their speakers' multiple interacting identities.

Even though users of Australian ethnolects do not constitute a single social group, a number of commentators have identified a pan-ethnic variety that has been popularly referred to as 'Wogspeak', used especially by young Australians of second-generation Middle Eastern and Mediterranean background. This variety serves as a strong badge of identity, enabling its speakers to differentiate themselves from both their parents' values and those of the Anglo host culture. Varieties used by second- (or later) generation Australians are, by definition, varieties of Australian English. Recall that Australian English is spoken by those who are born and/or raised in Australia. Some ethnolectal varieties may be distinguished by phonological features, such as the avoidance of reduced vowels (as in the use of a full vowel [ɐ] as an allophone of schwa in the final syllable of a word such as *pleasure*), and grammatical features such as double negation. Within the non-mainstream ethnolects in Australia there is a wide range of linguistic variation.

Genderlects

In the earliest work on women and language a number of features were identified that occurred more frequently in the speech of women compared to men. For example, women were found to 'hedge' their speech more often than men, with expressions like *I suppose*, *I would imagine*, *This is probably wrong*, *sort of*, *but* and so on. Women have also been shown to use tag questions more frequently to qualify their statements (*He's not a very good actor, is he?*), as well as words of politeness (*please*, *thank you*) and intensifying adjectives, such as *really* and *so* (*It's a really good film*, *It's so nice of you*).

Since this early work, an increasing number of scholars have conducted research on language, gender and sexism, investigating the differences between male and female speech and their underlying causes. Many sociolinguists studying gender differences in speech now believe that women use devices such as the ones just described in order to express friendliness and solidarity, a sharing of attitudes and values, with their listeners.

There is a widespread belief that when men and women converse, women talk more and also tend to interrupt more than men in conversation. This is a frequent theme in sitcoms and the subject of jokes and sayings in various cultures, such as the English proverb 'Women's tongues are like lambs' tails – they are never still' or the Chinese proverb 'The tongue is the sword of a woman and she never lets it become rusty'. However, empirical studies of mixed-sex conversations show that in a number of different contexts, men dominate the talking, particularly in non-private conversation, such as television interviews, business meetings and conference discussions, where talking can increase one's status.

This dominance of males in speaking situations seems to develop at an early age. It occurs in classrooms in which boys dominate talk time with the teachers. One study reported in Sadker and Silber (2007) found that boys were eight times more likely to call out answers than girls.[14] There is also evidence that teachers encourage this dominant behaviour, reprimanding girls more often than boys when they call out.

It has also been observed that women are more conservative in their speech styles. For example, they are less likely to use vernacular forms, such as the reduction of *ing* to *in*' or *him* to *'im* as in *I was walkin' down the street when I saw 'im*. In some dialects of English word-initial *h* can be dropped in casual speech, as in *'enry* (Henry), *'appy* (happy). This *h*-less pronunciation happens more frequently in the speech of men than women. The tendency for women to speak more formally than men has been confirmed in many studies and appears to develop at an early age. Children as young as six show this pattern, with girls avoiding the vernacular forms used more commonly by boys from the same background.

A general view among sociolinguists is that women tend to use more prestigious English than men because of an insecurity caused by sexism in society. Among some of the more specific reasons that have been suggested are that women use more standard language to gain access to senior-level jobs that are often less available to them, that society tends to expect 'better' behaviour in general from women than men, that people who find themselves in subordinate roles (as women do in many societies) feel pressure to be more polite, and that men prefer to use more vernacular forms because it helps to identify them as tough and strong. It has also been suggested that most sociolinguistic experiments are conducted by middle-class, well-educated academics and it is possible that the women who are interviewed 'accommodate' to the interviewer, changing their speech to be more like the interviewer's or simply in response to the more formal nature of the interview situation. Men, on the other hand, may be less responsive to these perceived pressures.

The different variants of English used by men and women are sometimes called *genderlects*. Variations in the language of men and women occur in many, if not all, languages. In Japanese, women may choose to speak a distinct female dialect, although they know the standard dialect used by both men and women. The Japanese language has many honorific words – words intended to convey politeness, respect, humility and lesser social status in addition to their regular meaning. As noted earlier, women tend to use polite forms more often than men. Japanese has formal and informal verbal inflections (see exercise 16, Chapter 3) and again, women use the formal forms more frequently. There are also different words in Japanese used in male and female speech, for example:

	Women's word	Men's word
stomach	onaka	hara
delicious	oishii	umai
I/me	watashi	boku

and phrases such as:

eat a meal	gohan-o taberu	meshi-o kuu
be hungry	onaka-ga suita	hara-ga hetta
	stomach become empty	stomach decrease

The differences discussed thus far have more to do with language use – lexical choices and conversational styles – than with grammatical rules. There are, however, cases in which the language spoken by men and women differ in their grammars. Early descriptions of the Muskogean language Koasati, spoken in Louisiana, report that words that end in /s/ when spoken by men, end in /l/ or /n/ when used by women; for example, the word meaning 'lift it' is *lakawhol* for women and *lakawhos* for men. In Yana, women's words are sometimes shorter than men's because of different phonological processes and suffixation used by males and females. For example, the women's form for 'deer' is *ba*, the men's *ba-na*; for 'person' we find *yaa* versus *yaa-na* and so on.[15] Early explorers reported that the men and women of the Carib Indians used different dialects. A possible historical explanation for this is that long ago a group of Carib-speaking men invaded an area inhabited by Arawak-speaking people and killed all the men. The women who remained then continued to use Arawak while their new husbands spoke Carib.

In Chiquitano, a Bolivian language, the grammar of male language includes a noun-class gender distinction, with names for males and supernatural beings morphologically marked in one way and nouns referring to females marked in another. In Thai, utterances may end with 'politeness particles', k^h*rap* for men and k^h*a* for women (tones have been omitted). Thai also has different pronouns and fixed expressions like *please* and *thank you* that give each genderlect a distinctive character.

One obvious phonetic characteristic of female speech is its relatively higher pitch, caused mainly by shorter and smaller vocal folds. Nevertheless, studies have shown that the difference in pitch between male and female voices is generally greater than would be accounted for by physiology alone, suggesting that some social factors may be at work, possibly beginning during language acquisition.

Margaret Thatcher, the former prime minister of England, is a well-known example of a woman altering her vocal pitch, in this case for political reasons. Thatcher's regular speaking voice was quite high. She was counselled by her advisers to lower her voice and to speak more slowly and with less extensive pitch changes in order to sound more authoritative. This new speaking style became a strong characteristic of her public addresses.

Sociolinguistic analysis

sociolinguistic variable
A linguistic phenomenon, such as double negation, whose occurrence varies according to the social context of the speaker.

Speakers from different socioeconomic groups often display systematic speech differences, even when region and ethnicity are not factors. These social-class dialects may differ from other dialects in that their **sociolinguistic variables**, while still systematic, are often statistical in nature. For some features associated with regional or social dialects, a differing lexical or grammatical characteristic may be either present or absent (for the most part), so regional groups who say 'tap' (for the device that dispenses water) say it pretty much all the time, as do the regional groups who say 'faucet'.

Social class dialects may differentiate themselves in a more quantitative way; for example, one class of speakers may use a certain feature 80 per cent of the time to distinguish it from another that uses the feature 40 per cent of the time. Linguist William Labov carried out a sociolinguistic analysis in New York City in the 1960s that focused on the rule of *r*-dropping that we discussed earlier, and its use by upper-, middle- and lower-class speakers.[16] In this classic study, a model for subsequent sociolinguistic analysis, Labov first identified three department stores that catered primarily to the three social classes: Saks Fifth Avenue, Macy's, and S Klein – upper, middle and lower, respectively. To elicit data, he would go to the three stores and ask questions that he knew would evoke the words *fourth* and *floor*. People who applied the *r*-dropping rule would not use *r* in these words, whereas ones who did not apply the rule would use *r*.

The methodology behind much of Labov's research is important to note. Labov interacted with all manner of people in their own environment where they were comfortable, although he took care when analysing the data to take into account ethnic and gender differences. In gathering data he was careful to elicit naturally spoken language through his casual, unassuming manner. In his methodology, he took pains to reduce the impact of the observer's paradox. This paradox is that in linguistic analysis we need to examine how people talk when they are not being observed, but the only way to obtain valid data is through careful observation. He would evoke the same answer twice by pretending not to hear or understand, and in that way was able to collect informal, casual utterances and utterances spoken (the second time) with more care.

In Saks, 62 per cent of respondents pronounced the *r* at least some of the time, in Macy's it was 52 per cent and in S Klein a mere 21 per cent. The *r*-dropping rule, then, was socially 'stratified', to use Labov's terminology, with the lower-social-class dialects applying the rule most often. What makes Labov's work so distinctive (and distinguished) is his methodology and his discovery that the systematic differences among dialects can be usefully defined on a quantitative basis of rule applications, rather than the strict presence or absence of a rule. He also showed that social context and the sociolinguistic variables that it governs play an important role in language change (discussed in Chapter 10).

Languages in contact

> If more English native speakers walked through the doors of other languages, they would discover undreamed-of landscapes. Perhaps some of them might then begin to think that the truly blessed are not they themselves, but those who are eternally condemned to reflect on language, eternally condemned to marvel at the richness of the world.
>
> Minae Mizumura, *The Fall of Language in the Age of English*, 2015

Human beings are great travellers, traders and colonisers. The mythical tales of nearly all cultures tell of the trials and tribulations of travel and exploration, such as those of Odysseus (Ulysses) in Homer's *Odyssey*. Surely one of the tribulations of ranging outwards from your home is that sooner or later you will encounter people who do not speak your language, nor you theirs. In some parts of the world, you may not have to travel farther than next door to find the language disconnect, and in other parts you may have to cross an ocean. Because this situation is so common in human history and society, several solutions for bridging this communication gap have arisen.

Lingua francas

> Language is a steed that carries one into a far country.
>
> Arab proverb

Many areas of the world are populated by people who speak diverse languages. In such areas, where groups desire social or commercial communication, one language is often used by common agreement. Such a language is called a **lingua franca**.

lingua franca
A language common to speakers of diverse languages that can be used for communication and commerce.

In medieval times, a trade language based largely on the languages that became modern Italian and Provençal came into use in the Mediterranean ports. That language was called Lingua Franca, 'Frankish language'. The term *lingua franca* was generalised to other languages similarly used. Therefore, any language can be a lingua franca.

English has been called 'the lingua franca of the whole world' and is standardly used at international business meetings and academic conferences. French, at one time, was 'the lingua franca of diplomacy'. Russian serves as the lingua franca in the countries of the former Soviet Union, where many different local languages are spoken. Latin was a lingua franca of the Roman Empire and of western Christendom for a millennium, just as Greek served eastern Christendom as its lingua franca. Yiddish has long served as a lingua franca among Jewish people, allowing communication between people of different nationalities.

More frequently, lingua francas serve as trade languages. East Africa is populated by hundreds of villages, each with its own language, but most Africans of this area learn at least some Swahili as a second language, and this lingua franca is used and understood in nearly every marketplace. A similar situation exists in Nigeria, where Hausa is the lingua franca.

Hindi and Urdu are the lingua francas of India and Pakistan. The linguistic situation of this area of the world is so complex that there are often regional lingua francas – usually local languages surrounding commercial centres. The Dravidian language Kannada is a lingua franca for the area surrounding the south-western Indian city of Mysore. A similar situation existed in Imperial China.

In modern China, 94 per cent of the people speak Han languages, which can be divided into major language groups that for the most part are mutually unintelligible. Within each language group there are hundreds of dialects. In addition to the Han languages, there are more than fifty 'national minority' languages, including the five principal ones: Mongolian, Uyghur, Tibetan, Zhuang and Korean.[17]

The situation is complex and therefore the government inaugurated an extensive language reform policy to establish as a lingua franca the Beijing dialect of Mandarin, with elements of grammar from northern Chinese dialects and enriched with the vocabulary of modern colloquial Chinese. They called this dialect Putonghua, meaning 'common speech'. The native languages and dialects are not considered inferior. Rather, the approach is to spread the 'common speech' so that all may communicate with one another in this lingua franca.

Certain lingua francas arise naturally, while others are instituted by government policy and intervention. In many parts of the world, however, people still cannot speak with their neighbours only a few kilometres away.

Contact languages: pidgins and creoles

> I include 'pidgin English' … even though I am referred to in that splendid language as 'Fella bilong Mrs Queen'.
>
> Prince Philip, husband of Queen Elizabeth II

pidgin
A simple but rule-governed language developed for communication among speakers of mutually unintelligible languages, often based on one of those languages.

A lingua franca is typically a language with a broad base of native speakers, likely to be used and learnt by people with different native languages (usually in the same language family). Often in history, however, speakers of mutually unintelligible languages have been brought into contact under specific socioeconomic and political conditions and have developed a language to communicate with one another that is not native to anyone. Such a language is called a **pidgin**.

Pidgins

superstrate language
The language that provides most of the lexical items of a **pidgin** or **creole**, typically the language of the socially or economically dominant group; also called lexifier language.

substrate languages
The language(s) of the indigenous people in a language contact situation that contributes to the **lexicon** and **grammar** of a **pidgin** or **creole** but in a less obvious way than the **superstrate language**.

Many pidgins developed during the seventeenth, eighteenth and nineteenth centuries in trade colonies along the coasts of China, Africa and the New World. These pidgins arose through contact between speakers of colonial European languages, such as English, French, Portuguese and Dutch, and the indigenous, non-European languages. Some pidgins arose among extended groups of slaves and slave owners in the US and the Caribbean in the nineteenth century. Other cases include Hawaiian Pidgin English, which was established on the pineapple plantations of Hawaii among immigrant workers from Japan, China, Portugal and the Philippines; Chinook Jargon, which evolved among the Indian tribes of the Pacific Northwest as a lingua franca among the tribes themselves as well as between the tribes and European traders; and various pidgins that arose during the Korean and Vietnam wars for use between foreign soldiers and local civilians.

In all these cases, the contact is too specialised and the cultures too widely separated for the native language of any one group to function effectively as a lingua franca. Instead, the two or more groups use their native languages as a basis for developing a rudimentary lingua franca with reduced grammatical structures and a small lexicon. Also in these situations, it is generally the case that one linguistic group is in a more powerful position, economically or otherwise, such as the relationship of plantation owners to workers or slave owners to slaves. Most of the lexical items of the pidgin come from the language of the dominant group. This language is called the **superstrate language**, or lexifier language. For example, English (the language of the plantation owners) is the superstrate language for Hawaiian Pidgin English; Swahili for the various forms of Pidgin Swahili spoken in East and Central Africa; and Bazaar Malay for pidgins spoken in Malaysia, Singapore and Indonesia. The other language or languages also contribute to the lexicon and grammar, but in a less obvious way. These are called **substrate languages**. Japanese, Chinese, Tagalog and Portuguese were the substrate languages of Hawaiian Pidgin English and all contributed to its grammar. Chinook Jargon of the Pacific Northwest had features both from indigenous languages of the area, such as Chinook and Nootka, as well as from French and English.

Many linguists believe that pidgins form part of a linguistic 'life cycle'. In the very early stage of development, the pidgin has no native speakers and is strictly a contact language. Its use is reserved for specialised functions, such as trading or work-oriented tasks, and its speakers speak their (respective) native languages in all other social contexts. In this early stage, the pidgin has little in the way of clear grammatical rules and few (usually specialised) words. Later, however, if the language continues to exist through necessity, a much more regular and complex form of pidgin evolves, sometimes called a 'stabilised pidgin', and this allows it to be used more effectively in a variety of situations. Further development leads to the creation of a **creole**, which most linguists believe has all the grammatical complexity of an ordinary language. Pidginisation (the creation of a pidgin) therefore involves a simplification of languages and a reduction in the number of domains of use. Creolisation, in contrast, involves linguistic expansion in the lexicon and grammar of existing pidgins and an increase in the contexts of use. We discuss creoles and creolisation further in the next section.

creole
A language that begins as a **pidgin** and eventually becomes the first language of a speech community through its children.

Although pidgins are in some sense rudimentary, they are not devoid of rules. The phonology is rule-governed, as in any human language. The inventory of phonemes is generally small; for example, whereas Mainstream Australian English has nineteen distinct vowel sounds, pidgins commonly have only five to seven and each phoneme may have a great deal of phonetic variation. In one English-based pidgin, for example, [s], [ʃ] and [ʧ] are all possible productions for the phoneme /s/; [masin], [maʃin] and [maʧin] all mean 'machine'. Sounds that occur in both the superstrate and substrate languages will generally be maintained, but if a sound occurs in the superstrate but not in the substrates, it will tend to be eliminated. For example, the English sounds [ð] and [θ] as in *this* and *thing* are quite uncommon across languages. Many speakers of English pidgins convert these *th* sounds to more common ones, pronouncing *this thing* as 'dis ting'.

Typically, pidgins lack grammatical words, such as auxiliary verbs, prepositions and articles, and inflectional morphology including tense and case endings, as in:

He bad man.	He is a bad man.
I no go bazaar.	I'm not going to the market.

There are also some grammatical rules. In several English-based pidgins, verbs that take a direct object must have the suffix *-m* or *-im*, even if the direct object is absent. Here are some examples of the application of this rule:

Mi driman long kil*im* wanpela snek.
*Mi driman long kil wanpela snek.
I dream of killing a snake.
Bandarap i bin kuk*im*.
*Bandarap i bin kuk.
Bandarap cooked (it).

Bound morphology is largely absent. For example, some English pidgins have the word *sus* from the English *shoes*, but *sus* does not include a plural morpheme as it is used to refer to both a single shoe as well as multiple shoes. Note that this has happened in the development of English, too. Originally, the ending -a was a plural marker for Latinate words such as agenda but has come to have a singular meaning and the plural of agenda is now agendas.

Verbs and nouns usually have a single shape and are not altered to mark tense, number, gender or case. The set of pronouns is often simpler in pidgins. In Kamtok, an English-based pidgin spoken in Cameroon, the pronoun system does not show gender or the same case differences that exist in Standard English (SE):

Kamtok			Standard English		
a	mi	ma	I	me	my
yu	yu	yu	you	you	your
i	i/am	i	he	him	his
i	i/am	i	she	her	her
wi	wi	wi	we	us	our
wuna	wuna	wuna	you	you	your
dem	dem/am	dem	they	them	their

Pidgins also may have fewer prepositions than the languages on which they are based. In Kamtok, for example, fɔ means 'to', 'at', 'in', 'for' and 'from', as shown in the following examples:

Gif di buk fɔ mi.	Give the book to me.
I dei fɔ fam.	She is at the farm.
Dɛm dei fɔ chɔs.	They are in the church.
Du dis wan fɔ mi, a bɛg.	Do this for me, please.
Di mɔni dei fɔ tebul.	The money is on the table.
You fit muf tɛn frank fɔ ma kwa.	You can take ten francs from my bag.

Other morphological processes are more productive in pidgins. Reduplication is common, often to indicate emphasis. For example, in Kamtok, *big* means 'big' and *big-big* means 'enormous'; *luk* means 'look' and *luk-luk* means 'stare at'. Compounding is also productive and serves to increase the otherwise small lexicons. The reference to Prince Philip in the epigraph at the beginning of this section is an example (*fella bilong* [meaning 'husband'] *Mrs Queen*), as are the following:

big ai	greedy
drai ai	brave
gras bilong fes	beard
gras antap long ai	eyebrow
gras bilong head	hair
han bilong pisin	wing (of a bird)

Most words in pidgin languages also function as if they belong to several syntactic categories. For example, the Kamtok word *bad* can function as an adjective, noun or adverb:[18]

Adjective	tu bad pikin	two bad children
Noun	We no laik dis kain bad	We don't like this kind of badness
Adverb	A liakam bad	I liked it very much

In terms of syntax, early pidgins have a simple clausal structure, lacking embedded sentences and other complex complements. And word order may be variable so that speakers from different linguistic backgrounds can adopt the order of their native language and still be understood. For example, Japanese is an SOV (verb final) language and a Japanese speaker of an English-based pidgin may put the verb last, as in *The poor people all potato eat*. On the other hand, a Filipino speaker of Tagalog, a VSO language, may put the verb first, as in *Work hard these people*. Word order eventually becomes more rigid in established pidgins and creoles, which are more like other languages with respect to the range of clause types.

Pidgin has come to have negative connotations, perhaps because many pidgins were associated with European colonial empires. The *Encyclopedia Britannica* once described pidgins as

> 'an unruly bastard jargon, filled with nursery imbecilities, vulgarisms and corruptions'.

It no longer uses such a definition. In recent times there is greater recognition that pidgins reflect human creative linguistic ability and show many of the defining characteristics of language in general.

Pidgins also serve a useful function. For example, it is possible to learn an English-based pidgin well enough in six months to begin many kinds of semi-professional training. Learning English for the same purpose might take considerably longer. In areas with many mutually unintelligible languages, a pidgin can play a vital role in unifying people of different cultures and ethnicities.

In general, pidgins are short-lived, perhaps spanning several human generations, although a few have lasted much longer. Pidgins may die out because the speakers all come to share a common language. This was the fate of Chinook Jargon, whose speakers all learnt English. Also, because pidgins are often disdained, there is social pressure for speakers to learn a 'standard' language, usually the one on which the pidgin is based. For example, through massive education, English replaced a pidgin spoken in New Zealand by the Māori, although, as we have discussed, in recent times there has been a sustained government campaign to champion and reinvigorate Māori language. Although it failed to succumb to years of government interdiction, Chinese Pidgin English could not resist the onslaught of English that fuelled its demise by the close of the nineteenth century. Finally, and ironically, the death of a pidgin language may come about because of its success in uniting diverse communities; the pidgin proves so useful and becomes so widespread that successive generations in the communities in which it is spoken adopt it as their native tongue, elaborating its lexicon and grammar to become a creole.

Creoles and creolisation

> Padi dɛm; kɔntri; una ɔl we de na Rom.
> Mɛk una ɔl kak una yes. A kam bɛr Siza,
> a nɔ kam prez am.
>
> Shakespeare, *Julius Caesar*, 3.2, translated to Krio by Thomas Decker

A creole is defined as a language that has evolved in a contact situation to become the native language of a generation of speakers. The traditional view is that creoles are the creation of children who, exposed to an unstable pidgin, develop a far richer and more complex language that shares the fundamental characteristics of a 'regular' human language and allows speakers to use the language in all domains of daily life.

In contrast to pidgins, creoles may have inflectional morphology for tense, plurality and so on. For example, in creoles spoken in the South Pacific the affix -*im* is added to transitive verbs, but when the verb has no object the -*im* ending does not occur:

man i pairip*im* masket.

man be fired-him musket

The man fired the musket.

masket i pairip.

musket be fired

The gun was fired.

The same affix *-im* is used derivationally to convert adjectives into verbs, like the English *-en* in *redden*:

bik	big	bikim	to make something big
daun	down	daunim	to lower something down
nogut	no good	nogutim	to spoil, damage

Creoles typically develop more complex pronoun systems. For example, in the creoles of the South Pacific there are two forms of the pronoun *we*: inclusive *we*, referring to speaker and listener, and exclusive *we*, referring to the speaker and other people but not the listener. The Portuguese-based Cape Verdean Creole has three classes of pronouns: strong, weak and clitic (meaning affixed to another word, like the possessive *'s* of English), as illustrated in **Table 9.1**.

Table 9.1 Classes of pronouns in Portuguese-based Cape Verdean Creole

	Emphatic (strong) forms	Free (weak) forms	Subject clitics	Object clitics
1sg	ami	mi	N-	-m
2sg (informal)	abo	bo	bu-	-bu/-u
2sg (formal, masc.)	anho	nho	nhu-	
2sg (formal, fem.)	anha	nha		
3sg	ael	el	e-	-l
1pl	anos	nos	nu-	-nu
2pl	anhos	nhos		
3pl	aes	es	-s	

Note that the first-person singular subject clitic is represented as N to signify that its place of articulation can change depending on the characteristics of the consonant at the beginning of the following verb.

The compounds of pidgins often reduce in creoles; for example, *wara bilong skin*, 'water belong skin', meaning 'sweat' becomes *skinwara*. The compound *baimbai*, 'by and by', used to indicate future time, becomes a tense inflection *ba* in the creole. Therefore, the sentence *baimbai yu go*, 'you will go' becomes *yu bago*. The phrasal structure of creoles is also vastly enriched, including embedded and relative clauses, among many other features of 'regular' languages.

How are children able to construct a creole based on the rudimentary input of the pidgin? One possibility is that they use their innate linguistic capacities to rapidly transform the pidgin into a fully-fledged language. This would account for the many grammatical properties that creoles have in common; for example, SVO word order, and tense and aspect distinctions.

It should be noted that defining pidgins and creoles in terms of whether they are native (creoles) versus non-native second languages (pidgins) is not without problems. There are languages such as Tok Pisin, widely spoken in New Guinea, which are first languages to many speakers but also used as a second, contact language by other speakers. Some linguists have also rejected the idea that creoles derive from pidgins, claiming that the geographical areas and social conditions under which they develop are different.

Moreover, the view that children are the creators of creoles is not universally accepted. Various linguists believe that creoles are the result of imperfect second-language learning of the lexifier or dominant language by adults and the 'transfer' of grammatical properties from their native non-European languages. This hypothesis would account for some of the characteristics that creoles share with second language 'interlanguages' (see Chapter 7 on language acquisition); for example, invariant verb forms, lack of determiners and the use of adverbs rather than verbs and auxiliaries to express tense and modality.

Although some linguists believe that creoles are simpler systems than 'regular' languages, most researchers who have closely examined the grammatical properties of various creoles argue that they are not structurally different from non-creole languages and that the only exceptional property of creoles is the sociohistorical conditions under which they evolve.

Creoles often arose on slave plantations where people of many different African tribes spoke mutually incomprehensible African languages. Haitian Creole, based on French, developed in this way, as did the English varieties spoken in parts of Jamaica. Gullah is an English-based creole spoken by the descendants of African slaves on islands off the coast of Georgia and South Carolina. Louisiana Creole, related to Haitian Creole, is spoken by large numbers of people with diverse ethnic backgrounds in Louisiana. Krio, the language spoken by as many as a million Sierra Leoneans and illustrated in the epigraph to this section, developed at least in part from an English-based pidgin.

One of the theories concerning the origins of African-American English (AAE) is that it derives from an earlier English-based creole that developed when African slaves had no common language other than the English spoken by their colonial masters. Proponents of this hypothesis point out that at least some of the unique features of AAE are traceable to influences of the West African languages once spoken by the slaves or their parents/grandparents. In addition, several features of AAE, such as aspect marking (distinct from that which occurs in Standard English), are typical of creole languages. The alternative view is that AAE formed directly from English without any pidgin/creole stage. It is apparent that AAE is closer to Southern dialects of American English than to other dialects. It is possible that the African slaves learnt the English of Anglo-American Southerners as a second language. It is also possible that many of the distinguishing features of Southern dialects were acquired from AAE during the many decades in which a large number of Southern Anglo-American children were raised by African-American women and interacted with African-American children.

Tok Pisin, originally a pidgin, was gradually creolised throughout the twentieth century. It evolved from Melanesian Pidgin English, once a widely spoken lingua franca of Papua New Guinea used by English-speaking traders and the native population. Because New Guinea is so linguistically diverse – more than 800 different languages were once spoken throughout the island – the pidgin came to be used as a lingua franca among the indigenous population as well.

Tok Pisin has its own writing system, its own literature and its own newspapers and radio programs; it has been used to address the United Nations. Papers in Tok Pisin have been presented at linguistics conferences in Papua New Guinea and it is commonly used for debates in the parliament of the country. Today, Tok Pisin is one of the three recognised national languages of the independent state of Papua New Guinea and the most commonly used language, alongside English and Hiri Motu, another creole.

The Australian Aboriginal Kriol and Yumplatok (Torres Strait Creole) arose in forcibly mixed linguistic communities and in some of these, creole is the mother tongue of at least four generations of speakers. In 2020, the National Indigenous Languages Report estimated that there were between 20 000 and 30 000 speakers of Kriol and of Yumplatok.[19] First-language creole speakers need to learn Aboriginal English as a second language just as other Aboriginal and Torres Strait Islander language speakers do. Andy Butcher reports that sometimes it is hard to tell the difference between the creole and the basilectal variety of Australian Aboriginal English.[20] He suggests that the vast majority of Kriol speakers also use Aboriginal English and that codeswitching is common. Grammatical criteria can be used to distinguish between the two, including devices commonly used in English-based creoles, such as the auxiliary *bin* to mark past tense, the use of the suffix *-bat* to mark iterative or durative aspect, the use of the suffix *-im* as a marker of transitivity and the use of *blong* as a possessive marker. The majority of

Aboriginal English speakers use an acrolectal variety of Aboriginal English as their first and only language. There are certain phonological differences between Mainstream Australian English and Aboriginal English, but the number and degree of difference depends on the particular variety of Aboriginal English that the speaker uses. See Butcher (2008) for some detail.

Some sign languages may also be considered pidgins. In Nicaragua in the 1980s, adult deaf people came together and constructed a system of 'home' signs and gestures in order to communicate. It had the characteristics of a pidgin in that different people used it differently and the grammatical rules were few and varied. However, when young deaf children joined the community, an amazing event took place. The more limited sign language of the adults was tremendously enhanced by the children learning it, so much so that it emerged as a rich and complex sign language called *Idioma de Signos Nicaragüense* (ISN) or Nicaraguan Sign Language. ISN provides an impressive demonstration of the development of a grammatically complex language from impoverished input and the power of human linguistic creativity.

The study of pidgins and creoles has contributed a great deal to our understanding of the nature of human language and the processes involved in language creation and language change, and of the sociohistorical conditions under which these instances of language contact occur.

Bilingualism

> He who has two languages has two souls.
>
> Anonymous

individual bilingualism
The ability of an individual speaker to speak two languages with native or near-native proficiency.

societal bilingualism
The mutual abilities of a community to speak two (or more) languages with native or near-native proficiency.

multilingualism
The ability to speak more than two languages.

The term bilingualism refers to the ability to speak two languages, either of individual speakers, **individual bilingualism**, or within a society, **societal bilingualism**. **Multilingualism** is the ability to speak more than two languages. In Chapter 7 we discussed how bilingual children may simultaneously or sequentially acquire their two languages and how second languages are acquired by children and adults. There are various degrees of individual bi- or multilingualism. Some people have native-like control of two languages (or more), whereas others make regular use of two languages with a high degree of proficiency but lack the linguistic competence of a native or near-native speaker in one or the other language. Also, some bi- or multilinguals may have oral competence but do not read or write one (or more) of their languages.

The situations in which people become bi- or multilingual may vary. Some people grow up in a household in which more than one language is spoken; others move to a new country where they acquire the local language, usually from people outside the home. Still others learn second languages in school. In communities with rich linguistic diversity, contact between speakers of different languages may also lead to bi- or multilingualism.

Bilingualism (or multilingualism) also refers to the situation in nations in which two (or more) languages are spoken and recognised as official or national languages. Societal bilingualism exists in many countries, including Canada, where English and French are both official languages, and Switzerland, where French, German, Italian and Romansch all have official status. In Singapore, the national language is Malay, but English, Tamil and Mandarin are also official languages.

Interestingly, research shows that there are fewer bilingual individuals in bilingual countries than in so-called 'unilingual' countries. This makes sense when you consider that in unilingual countries, such as the US, Italy and France, people who do not speak the dominant language must learn some amount of it to function. Also, the main concern of multilingual states has been the maintenance and use of two or more languages, rather than the promotion of individual bilingualism among its citizens.

The 2016 Australian Census showed that two thirds (67 per cent) of the Australian population were born in Australia and nearly half (49 per cent) of the population were either been born overseas or had at least one parent born overseas. There were over 300 languages spoken in Australian homes and more than 20 per cent of Australians spoke a language other than English. After English, the next most common languages in the community were Mandarin, Arabic, Cantonese and Vietnamese.

Codeswitching

Bi- or multilingual) speakers often engage in **codeswitching** in which fluent speakers switch languages/dialects between or within sentences, as illustrated by the following sentence:

codeswitching The movement back and forth between two languages or dialects within or between sentences or discourse.

Sometimes I'll start a sentence in English and termino en español.
Sometimes I'll start a sentence in English and finish it in Spanish.

Codeswitching is a universal phenomenon that reflects the grammars of both languages working simultaneously. Bilingual Spanish–English speakers may switch between English and Spanish as in the above example, whereas Québécois in Canada switch between French and English:

I mean, c'est un idiot, ce mec-là.
I mean he's an idiot, that guy.

The following examples are from German–English, Korean–English and Mandarin–English bilinguals:

Johan hat mir gesagt that you were going to leave.
Johan told me that you were going to leave.
Chigum ton-uls ops-nunde, I can't buy it.
As I don't have money now, I can't buy it.
Women zuotian qu kan de movie was really amazing.
The movie we went to see yesterday was really amazing.

Codeswitching occurs wherever groups of bilinguals speak the same two languages. Furthermore, codeswitching occurs in specific social situations, enriching the repertoire of the speakers.

A common misconception is that codeswitching is indicative of a language disability of some kind; for example, that bilinguals use codeswitching as a coping strategy for incomplete mastery of both languages or that they are speaking 'broken' English. These characterisations are completely inaccurate. Recent studies of the social and linguistic properties of codeswitching indicate that it is a marker of bilingual identity and has its own internal grammatical structure. For example, bilinguals will commonly codeswitch between a subject and a verb, as in:

Mis amigos finished first.	My friends finished first.

but would judge ungrammatical a switch between a subject pronoun and a verb, as in:

*Ellos finished first.	They finished first.

Codeswitchers also follow the word order rules of the languages. For example, in a Spanish NP the adjective usually follows the noun, as opposed to the English NP, in which it precedes, as shown by the following:

English: My mum makes green tamales.	Adj N
Spanish: Mi mamá hace tamales verdes.	N Adj

A speaker might codeswitch as follows:

My mum makes tamales verdes.

Mi mamá hace green tamales.

but would not accept or produce such utterances as:

*My mum makes verdes tamales.

*Mi mamá hace tamales green.

because the word order within the NPs violates the rules of the language.

Codeswitching is to be distinguished from borrowing, which occurs when a word or short expression from one language occurs embedded among the words of a second language and adapts to the regular phonology, morphology and syntax of the second language. In contrast, when codeswitching, the speaker interweaves the two languages and preserves the phonological and other grammatical properties. Borrowing can be easily distinguished from codeswitching by the pronunciation of an element. Sentence (1) involves borrowing and (2) codeswitching:

1 I love biscottis with my coffee.
2 I love biscotti with my coffee.

In sentence (1) *biscotti* takes the plural *-s* morpheme, while in (2) it preserves the Italian plural morpheme *-i* (plural for *biscotto*, 'biscuit').

What needs to be emphasised is that people who codeswitch have knowledge not of one but of two (or more) languages and that codeswitching, like linguistic knowledge in general, is highly structured and rule-governed.

Codeswitching also refers to a speaker's ability to use different languages, dialects or registers in different situations.

Language and education

> Outside of a dog, a book is a man's best friend; inside of a dog, it's too dark to read.
>
> Groucho Marx (1890–1977)

The study of language has important implications in various educational arenas. An understanding of the structure, acquisition and use of language is essential to the teaching of foreign and second languages, as well as to reading instruction. It can also promote a fuller understanding of language variation and use in the classroom, and inform the often heated debates surrounding issues such as how to teach reading to children, bilingual education and the use of non-mainstream varieties.

Second-language teaching

Many approaches to second- or foreign-language teaching have been developed over the years. Although these methods can differ significantly from one another, many experts believe that there is no single best method for teaching a second language. All methods have something to offer and any method can succeed with a gifted teacher who is a native or near-native speaker, motivated students, appropriate teaching materials, and authentic conversational practice with a native or competent speaker of the language. All methods are most effective when they fit a given educational setting and when they are understood and embraced by the teacher.

Second-language teaching methods fall into two broad categories: the *synthetic approach* and the *analytic approach*. As the name implies, the synthetic approach stresses the teaching of the grammatical, lexical, phonological and functional units of the language step by step. This is a bottom-up method. The task of the learner is to put together – or synthesise – the discrete elements that make up the language. The more traditional language teaching methods, which stress grammar instruction, fall into this category.

An extreme example of the synthetic approach is the **grammar translation** method favoured up until the mid-1960s, in which students learnt lists of vocabulary, verb paradigms and grammatical rules. Learners translated passages from the target language into their native language. The teacher typically conducted class in the students' native language, focusing on the grammatical parsing of texts, and there was little or no contextualisation of the language being taught. Reading passages were carefully constructed to contain only vocabulary and structures to which learners had already been exposed, and errors in translation were corrected on the spot. Learners were tested on their mastery of rules, verb paradigms and vocabulary. The students did not use the target language very much except in reading translated passages aloud.

grammar translation
A method of second-language learning in which the student memorises words and syntactic rules and translates them between the native language and the target language.

Analytic approaches are more top-down. The goal is not to explicitly teach the component parts or rules of the target language. Rather, the instructor selects topics, texts or tasks that are relevant to the needs and interests of the learner, whose job then is to discover the constituent parts of the language. This approach assumes that adults can extract the rules of the language from unstructured input, more or less as children do when acquiring their first language.

Currently, one of the most widely practised analytic approaches is *content-based instruction*, in which the focus is on making the language meaningful and on getting the student to communicate in the target language. Learners are encouraged to discuss issues and express opinions on various topics of interest to them in the target language. Topics for discussion might include 'online dating' or 'taking responsibility for our environment'. Grammar rules are taught on an as-needed basis and fluency takes precedence over grammatical accuracy. Classroom texts (both written and aural) are generally taken from sources that were not created specifically for language learners, on the assumption that these will be more interesting and relevant to the student. Assessment is based on the learner's comprehension of the target language.

Not all second-language teaching methods fall clearly into one or the other category. The synthetic and analytic approaches should be viewed as the opposite ends of a continuum along which various second-language methods may fall. Also, teachers practising a given method may not strictly follow all the principles of the method. Actual classroom practices tend to be more eclectic, with teachers using techniques that work well for them and to which they are accustomed – even if these techniques are not in complete accordance with the method they are practising.

Teaching reading

In Chapter 7 we discussed how young children acquire their native language. We noted that in some theories, language development, whether of a spoken or sign language, is considered a biologically-driven process with a substantial innate component. Parents do not teach their children the grammatical rules of their language. Indeed, they are not even aware of the rules themselves. Rather, the young child is naturally predisposed to uncover these rules from the language he or she hears around him or her. The way we learn to read and write, however, is quite different from the way we acquire the spoken/signed language.

First, and most obviously, children learn to talk (or sign) at a very young age, while reading typically begins when the child is school-age (around five or six years old in most cases, although some children are not reading-ready until later and some begin earlier). A second important difference is that across cultures and languages, all children acquire a spoken/signed language, while many children never learn to read or write. This may be because they are born into cultures for which there is no written form of their language. It is also unfortunately the case that even some children born into literate societies do not learn to read, either because they suffer from a specific reading disability, such as dyslexia, or because they have learning or developmental difficulties or have not been exposed to literacy in a way that assists their learning. It is important to recognise, however, that even illiterate children and adults have a mental grammar of their language and the vast majority of them are able to speak/sign and understand perfectly well.

The most important respect in which spoken/signed language development differs from learning to read is that reading requires specific instruction and conscious effort, whereas language acquisition does not. Which kind of instruction works best for teaching reading has been a topic of considerable debate for many decades. Three main approaches have been used.

The first – the *whole-word approach* – teaches children to recognise a vocabulary of some 50 to 100 words by rote learning, often by seeing the words used repeatedly in a story, for example, *Run, Spot, Run* from the Dick and Jane series well known to people who learnt to read in the 1950s. Other words are acquired gradually. This approach does not teach children to 'sound out' words according to the individual sounds that make up the words. Rather, it treats the written language as though it were a logographic system, such as Chinese, in which a single written character corresponds to a whole word or word root. In other words, the whole-word approach fails to take advantage of the fact that English is based on an alphabet, in which the symbols correspond to the individual sounds (roughly phonemes) of the language.

A second approach – *phonics* – emphasises the correspondence between letters and the sounds associated with them. Phonics instruction begins by teaching children the letters of the alphabet and then encourages them to sound out words based on their knowledge of the sound–letter correspondences. So, if you have learnt to read the word *gave* (understanding that the *e* is silent), then it is easy to read *save* and *pave*.

However, English and many other languages do not show a perfect correspondence between sounds and letters. For example, the rule for *gave*, *save* and *pave* does not extend to *have*. The existence of many such exceptions has encouraged some schools to adopt a third approach to reading, the *whole-language approach* (also called 'literature-based' or 'guided reading'), which was most popular in the 1990s. The key principle is that phonics should not be taught directly. Rather, the children are supposed to make the connections between sounds and letters themselves based on exposure to text. For example, they would be encouraged to figure out an unfamiliar word based on the context of the sentence or by looking for clues in the storyline or the pictures rather than by sounding it out.

The philosophy behind the whole-language approach is that learning to read, like learning to speak, is a natural act that children can basically do on their own – an assumption that, as we noted earlier, is questionable at best. With the whole-language approach, the main job of the teacher is to make the reading experience an enjoyable one. To this end, children are presented with engaging books and are encouraged to write stories of their own as a way of instilling a love of reading and words.

Despite the intuitive appeal of the whole-language approach (after all, who would deny the educational value of good literature and creative expression in learning?) research has clearly shown that understanding the relationship between letters and sounds is critically important in reading (see Castles, Rastle & Nation 2018 for an overview) [21]. One of the assumptions of the whole-language approach is that skilled adult readers do not sound out words when reading, so proponents question the value of focusing on sounding out in reading instruction. However, research shows that the opposite is true: skilled adult readers *do* sound out words mentally and they do so very rapidly. Another study compared groups of college students who were taught to read unfamiliar symbols, such as Arabic letters – one group with a phonics approach and the other with a whole-word approach. Those trained with phonics could read many more new words than those trained with the whole-word approach. Similar results have been obtained through computer modelling of how children learn to read. Classroom studies have also compared phonics with whole-word or whole-language approaches and have shown that phonics instruction produces better results for beginning readers.

The advantage of phonics is not contradicted by studies showing that deaf children who have fully acquired a sign language have difficulty learning to read. This is understandable because the alphabetic principle requires an understanding of sound–symbol regularities, which deaf children do not have. It seems reasonable, then, that hearing children should not be deprived of the advantage they would have if their unconscious knowledge of phonemes were made conscious.

At this point, the consensus among psychologists and linguists who do research on reading – and a view shared by many teachers – is that reading instruction must be grounded in a firm understanding of the connections between letters and sounds, and that whole-language activities that make reading fun and meaningful for children should be used to supplement phonics instruction.

Bilingual education

Increasing linguistic diversity in Australia has led to greater levels of bi- and multilingualism. Individuals display varying levels of English proficiency. Some people who have recently immigrated to Australia may have virtually no knowledge of English, other individuals may have only limited knowledge and others may be fully bi- or multilingual. Native-language development is untutored and happens before children begin school, but many children find themselves in classroom situations in which their native language is not the language of instruction. There has been a great deal of debate among researchers, teachers, parents and the general public over the best methods for teaching English to school-age children, and of the value in maintaining and promoting children's native-language abilities.[22]

Many studies have shown that immigrant children benefit from instruction in their native language. Bilingual classes allow the children to first acquire school-related vocabulary, speech styles and jargon in their native language while they are learning English. It also allows them to learn content material and keep pace with other children during the time it takes them to master English.

Language in use

One of the themes of this book is that you have a lot of linguistic knowledge that you may not be aware of. You also have a deep social knowledge of your language. You know the appropriate way to talk to your parents, your friends and your teachers. You know when it's okay to say 'ain't' and when it ain't okay, you know when to use cool language and when to speak formally, you know when to refer to the male sex organ as a 'dick' and when to call it, well, a 'male sex organ'. You even know, especially if you were born in the past 30 years, about 'politically correct' (PC) language, to say 'fire *fighter*' and 'police *officer*' and not to say 'fag', 'psycho' or 'cripple'. In short, you know how to use your language appropriately in the right contexts.

Just as your regional dialect identifies you geographically and your social dialect(s) identifies you socially, the way you use language may also indicate an inclination on your part to belong to a group. Gang members adopt a certain style of talk that helps them identify with the gang. Members of a profession identify themselves through the use of special terminology (e.g. *morphophonemics*) or by ascribing a special meaning to words such as *grammar* and *linguist*. Gay men and women may choose to use language to express themselves in a style that identifies them with the gay community. This section discusses some of the many ways in which the use of language varies in society.

Styles

Most speakers of a language speak one way with friends, another when at a job interview or presenting a report in class, another when talking to small children, another when talking to their parents and so on. These situational dialects are called **styles** (sometimes referred to as registers). A style is made up of a combination of linguistic characteristics (variables) that index certain meanings.

style
A situational **dialect**, e.g. formal speech, casual speech; sometimes referred to as registers.

Nearly everybody has at least an informal and a formal style. For example, in an informal style the rules of contraction are used more often, connected speech processes of phonology may be embraced more thoroughly, the syntactic rules of negation and agreement may be altered and many words are used that do not occur in the formal style.

Informal styles, although permitting certain abbreviations and deletions not permitted in formal speech, are also rule-governed. Questions, for example, are often shortened with the *you* subject and the auxiliary deleted. One can ask 'Running the marathon?' or 'You running the marathon?' instead of the more formal *Are you running the marathon?*, but you cannot shorten the question to **Are running the marathon?* Similarly, *Are you going to take the Linguistics 1 course?* can be abbreviated to *You gonna take the Ling 1 course?* or simply *Gonna take Ling 1?*, but not to **Are gonna take Ling 1?* It is not the case that anything goes in informal talk, but the rules permit greater deletion than the rules in the grammar of the formal language.

Speakers have the ability to use a number of different styles ranging between the two extremes of formal and informal. The use of styles is often a means of identification with a particular group (e.g. family, mob, gang, church, or team), or a means of excluding groups (e.g. cops, teachers, parents).

Many cultures have rules of social behaviour that strictly govern style. In some Indo-European languages there is a distinction between *you* (familiar) and *you* (polite). German *du* and French *tu* are to be used only with intimates; *Sie* and *vous* are more formal and used with non-intimates. Thai has three words for 'eat' depending on the social status of who is speaking to whom. Japanese and Javanese are also languages with elaborate styles that must be adhered to in certain social situations. Australian Indigenous languages have complex relational structures.

Slang

> there is no watertight compartment between outback slang and city slang; they had broken their banks and had begun to merge into the vast sea of words which is our language today.
>
> Sidney Baker 1945, *The Australian Language*

slang
Words and phrases used in casual speech, often invented and spread by close-knit social or age groups, and fast-changing.

One mark of an informal style is the frequent occurrence of **slang**. Almost everyone uses slang on some occasions. The use of slang, or colloquial language, introduces many new words into the language by recombining old words into new meanings. *Spaced out*, *hang-out* and *rip-off* have all gained a degree of acceptance. Slang may also introduce an entirely new word, such as *bae*, *YOLO* or *sup*, and slang often consists of ascribing totally new meanings to old words. *Cop* and *fuzz* are terms for 'police officer', and *cool*, *square*, *maggot*, *froth* and *salty* have also all extended their semantic domain. *Pot* and *weed* have widened their meanings to 'marijuana'.

The words we have cited sound slangy because they have not gained total acceptance in formal language. Words such as *glib (shortening of glibbery meaning slippery)* and *fake* (origin unknown) are former slang words that in time overcame their humble origins. It is not always easy to know where to draw the line between slang words and regular words. This confusion seems to have always been around. The borderland between slang and formal language is ill-defined and is more of a continuum than a boundary.

One generation's slang is another generation's standard vocabulary. *Fan* (as in *David Bowie fan*) was once a slang term, short for *fanatic*. *Phone*, too, was once a slangy, clipped version of *telephone*, as *TV* was of *television*. In Shakespeare's time *fretful* and *dwindle* were slang, and more recently *blimp* and *hot dog* were both slang. The use of slang also varies from region to region, so slang in Sydney and slang in Melbourne differ. For example, the word for a small glass of beer is a *middy* in Sydney and a *pot* in Melbourne. The word *slang* itself is slang in British English for 'scold'.

Slang words and phrases are often invented in keeping with new ideas and customs. They may represent attitudes more successfully than conservative items of the vocabulary. Their importance in society is evidenced by the fact that it was thought necessary to give returning US Vietnam prisoners of war a glossary of 86 new slang words and phrases, from *acid* to *zonked*.

There are scads (another slang word) of sources of slang. For example, it comes from the underworld: *rap (criminal charge), large ($1000)*; from youth culture: *adlay (lad)*, *slay* (to do well); from sports: football – *sitter* (an easy goal), surfing – *frothing* (excited), cricket: *slogger* (reckless batsperson). Slang is universal. It is found in all languages and all time periods. It varies from region to region and from past to present. Slang meets a variety of social needs, and rather than a corruption of the language, it is yet further evidence of the creativity of the human language user.

Jargon and argot

> It is common knowledge that students have a language that is quite peculiar to them and that is not understood very well outside student society … But if the code of behaviour somewhere is particularly lively, then the language of the students is all the richer for it – and vice versa.
>
> Friedrich Ch. Laukhard, 1792

Practically every conceivable science, profession, trade or occupation has its own set of words, some of which are considered to be technical (jargon) and others informal (**argot**), depending on the status of the people using these words. Linguistic jargon, some of which is used in this book, consists of terms such as *phoneme*, *morpheme*, *case*, *lexicon*, *phrase structure rule* and so on.

argot
The informal specialised words used by a particular group.

Part of the reason for specialised terminology is for clarity of communication, but part is also for speakers to identify themselves with persons with whom they share interests. Because the jargon used by different professional and social groups is so extensive (and so obscure in meaning), term banks have been established to help navigate this complexity (see for example, the Macquarie University TermFinder[23]).

The computer age not only ushered in a technological revolution, but it also introduced a huge jargon of 'computerese', including the words *modem* (a blend of *modulator* and *demodulator*), *bit* (a contraction of *binary digit*), *byte* (a collection of eight *bits*), *ROM* (an acronym for *read-only memory*), *RAM* (*random-access memory*), *CPU* (*central processing unit*), and *morphing* (the process of stretching, compressing and fading a two-dimensional image to make it appear as though it is turning into another two-dimensional image).

Some jargon may over time pass into the standard language. Jargon, like slang, spreads from a narrow group until it is used and understood by a large segment of the population.

Taboo or not taboo?

> Sex is a four-letter word.
>
> Bumper sticker

An item in a newspaper once included the following paragraph:

> 'This is not a Sunday school, but it is a school of law', the judge said in warning the defendants he would not tolerate the 'use of expletives during jury selection'. 'I'm not going to have my fellow citizens and prospective jurors subjected to filthy language,' the judge added.

How can language be filthy? In fact, how can it be clean? The filth or beauty of language must be in the ear of the listener, or in the collective ear of society. The writer Paul Theroux points this out:

> A foreign swear-word is practically inoffensive except to the person who has learned it early in life and knows its social limits.[24]

Nothing about a particular string of sounds makes it intrinsically clean or dirty, ugly or beautiful. If you say that you pricked your finger when sewing, no-one would raise an eyebrow, but if you refer to your professor as a 'prick', the judge quoted previously would undoubtedly censure this 'dirty' word.

You know the obscene words of your language and you know the social situations in which they are desirable, acceptable, forbidden and downright dangerous to utter. This is true of all speakers of all languages. All societies have their **taboo** words. (*Taboo* is a Tongan word meaning 'forbidden'.) People everywhere seem to have a need for undeleted expletives to express their emotions or attitudes.

taboo
Refers to words or activities that are considered inappropriate for polite society.

Forbidden acts or words reflect the particular customs and views of the society. Among the Zuni peoples of Western New Mexico, it is improper to use the word *takka*, 'frogs', during a religious ceremony. In the world of Harry Potter, the evil Voldemort is not to be named but is referred to as 'You-Know-Who'. In some religions, believers are forbidden to 'take the Lord's name in vain' and this prohibition often extends to other religious jargon.

Words relating to sex, sex organs and natural bodily functions make up a large part of the set of taboo words of many cultures. Often, two or more words or expressions can have the same linguistic meaning, with one acceptable and the other taboo. In English, words borrowed from Latin sound 'scientific' and therefore appear to be technical and 'clean', whereas native Anglo-Saxon counterparts are taboo. Such pairs of words are illustrated as follows:

Anglo-Saxon taboo words	Latinate acceptable words
cunt	vagina
cock	penis
balls	testicles
tits	breasts
shit	faeces, defecate

There is no grammatical reason why the word *vagina* is 'clean' whereas *cunt* is 'dirty', or why *balls* is taboo but *testicles* acceptable. Although there is no grammatical basis for such preferences, there certainly are sociolinguistic reasons to embrace or eschew such usages, just as there are sociolinguistic reasons for speaking formally, respectfully, disrespectfully, informally, using jargon and so on. The cartoon in **Figure 9.2** illustrates that taboo words may vary across generations.

Euphemisms

> Banish the use of the four-letter words
> Whose meaning is never obscure.
> The Anglos, the Saxons, those bawdy old birds
> Were vulgar, obscene, and impure.
> But cherish the use of the weaseling phrase
> That never quite says what it means
> You'd better be known for your hypocrite ways
> Than vulgar, impure, and obscene.
>
> Folk song attributed to the wartime Royal Air Force of Great Britain

Figure 9.2 **Taboo words vary across generations**

"There are some words I will not tolerate in this house—and 'awesome' is one of them."

CartoonStock/Edward Koren

The existence of taboo words and ideas motivates the creation of euphemisms. A **euphemism** is a word or phrase that replaces a taboo word or serves to avoid frightening or unpleasant subjects. In many societies, because death is feared, there are many euphemisms related to this subject. People are less apt to *die* and more apt to *pass on* or *pass away*. Those who take care of your loved ones who have passed away are more likely to be *funeral directors* than *morticians* or *undertakers*.

The use of euphemisms is not new. It is reported that the Greek historian Plutarch in the first century CE wrote that 'the ancient Athenians … used to cover up the ugliness of things with auspicious and kindly terms, giving them polite and endearing names. Thus they called harlots *companions*, taxes *contributions*, and prison *a chamber*'.

Just as surely as all languages and societies have taboo words, they have euphemisms. The aforementioned taboo word *takka*, 'frogs', is replaced during a Zuni religious ceremony by a complex compound word that literally translates as 'several-are-sitting-in-a-shallow-basin-where-they-are-in-liquid'. The euphemisms for bodily excretions and sexual activity are legion and lists of them may be found in online dictionaries of slang. There you will find such gems for male urination as *siphon the python* and *point Percy at the porcelain*, and for intercourse *shag*, *hide the ferret (salami, sausage)* and *toss a little leg*, among a gazillion others.

These euphemisms, as well as the difference between the accepted Latinate 'genteel' terms and the 'dirty' Anglo-Saxon terms, show that a word or phrase has not only a linguistic **denotative meaning** but also a **connotative meaning** that reflects attitudes, emotions, value judgements and so on. In learning a language, children learn which words are taboo, and these taboo words differ from one child to another, depending on the value system accepted in the family or group in which the child grows up.

euphemism
A word or phrase that replaces a taboo word or is used to avoid reference to certain acts or subjects, e.g. *powder room* for *toilet*.

denotative meaning
The referential meaning of a word or expression.

connotative meaning/ connotation
The evocative or affective meaning associated with a word. Two words or expressions may have the same **denotative meaning** but different connotations, e.g. *horse* and *nag*.

Racial and national epithets

The use of epithets for people of different religions, nationalities or races tells us something about the speakers. Words like *dago*, *chink*, *wog*, *nip* and *boong* reflect racist and chauvinist views of society and should be avoided.

Language, however, is creative, malleable and ever-changing. The epithets used by a majority to demean a minority may be reclaimed as terms of bonding and friendship among members of the minority. Therefore, for *some* Greek or Italian Australians the word *wog* is used to show affection. Similarly, the ordinarily degrading word *queer* is used among *some* gay persons as a term of endearment, as is *cripple* or *crip* among *some* individuals who share a disability.

Language and sexism

> If the English language had been properly organized … then there would be a word which meant both 'he' and 'she', and I could write, 'If John or Mary comes, heesh will want to play tennis', which would save a lot of trouble.
>
> A A Milne, *The Christopher Robin Birthday Book*, 1930

The discussion of obscenities, blasphemies, taboo words and euphemisms shows that words of a language are not intrinsically good or bad but reflect individual or societal values. In addition, one speaker may use a word with positive connotations while another may select a different word with negative connotations to refer to the same person. The same individual may, for example, be referred to as a 'protester' by one group and as a 'rioter' by another. A woman may be called a 'women's libber' or may be referred to as a 'feminist advocate'. The words we use to refer to certain individuals or groups reflect our individual non-linguistic attitudes and may also reflect the culture and views of society.

Language reflects sexism in society. Language itself is not sexist, just as it is not obscene, but it can convey sexist attitudes as well as attitudes about social taboos or racism.

Early dictionaries often gave clues to social attitudes of the time. In some twentieth century dictionaries, examples used to illustrate the meanings of words included 'manly courage' and 'masculine charm'. Women do not fare as well, as exemplified by 'womanish tears' and 'feminine wiles'. Contemporary dictionaries attempt to be scrupulous in avoiding sexist language.

Until recently, most people, on hearing 'My cousin is a professor' (or a doctor, or the vice-chancellor of the university, or a steel worker), assumed the cousin is a man; and if they heard someone say 'My cousin is a nurse' (or a primary school teacher or a receptionist) they would probably conclude that the speaker's cousin is a woman. This is now changing as societies show greater awareness of gender equality.

Despite flashes of enlightenment, words for women with abusive or sexual overtones abound: *dish*, *scrubber*, *slag*, *bush pig*, *piece*, *chick*, *bitch*, *slut* and *cow*, to name just a few. Far fewer such sexual terms exist for men, and those that do, such as *toy boy, hunk, wanker* and *jock* are not pejorative in the same way.

It is clear that language reflects societal attitude, positive or negative. Languages are infinitely flexible and expressive, but is language itself amoral and neutral? Or is there something about language, or a particular language, that abets sexism? Before we attempt to answer that question, let us look more deeply into the subject, using English as the illustrative language.

There is an asymmetry between male and female terms in which there are male–female pairs, the male form for the most part is unmarked and the female term is created by adding a bound morpheme or by compounding. We have many such examples in English:

Male	Female
prince	princess
count	countess
actor	actress
host	hostess
aviator	aviatrix
heir	heiress
hero	heroine
Robert	Roberta

With greater awareness of sexism in language and the fact that women occupy a diverse range of occupations, many of the marked female forms have now been replaced by the unmarked forms, which are used to refer to either sex. Therefore, women, as well as men, are referred to as authors, actors, heroes, firefighters, flight attendants and police officers.

The unmarked third person pronoun in English is male (*he, him, his*). *Everybody had better pay his fee next time* allows for the clients to be male or female, but *Everybody had better pay her fee next time* presupposes a female client. Attempts to find a suitable genderless third person pronoun have included forms such as *e, hesh, po, tey, co, jhe, ve, xe, he'er, thon*, and *na*, none of which speakers have been inclined to adopt. The use of the gender-neutral pronoun *they*, as in *Every teenager loves their first car*, is taking on greater currency. This is particularly pertinent in today's society where it is important to acknowledge the non-binarity of gender. Societies around the world are increasingly challenging the notion of gender binarity and are taking steps to ensure the use of gender inclusive language. For example, German grammar has male, female and neutral genders and many institutions are taking steps to use gender-neutral language, such as in Hanover where gender neutral nouns have been mandated in official correspondence. In Swedish, the pronoun *hen* has been introduced as the gender-neutral alternative to *han* (male) and *hon* (female).

The Sapir–Whorf hypothesis, discussed in Chapter 6, proposes that the way a language encodes (i.e. puts into words) different categories, such as male, female or other, subtly affects the way speakers of the language think about those categories. Therefore, it may be argued that because English speakers are often urged to choose *he* as the unmarked pronoun (*One should love his neighbour*) and to choose *she* only when the referent is overtly female, they tend to think of the male sex as predominant. Likewise, the fact that nouns require special affixes to make them feminine forces people to think in terms of male and female, with the female somehow more derivative because of affixing. The different titles, *Mr*, *Mrs*, *Miss* and *Ms*, also emphasise the male–female distinction (compare with Japanese, which, although it has distinctive genderlects, has the gender-neutral morpheme -*san* for polite address). The preponderance of words denigrating females in English and many other languages may create a climate that is more tolerant of sexist behaviour.

Secret languages and language games

Throughout the world and throughout history, people have invented secret languages and language games. These special languages are used either as a means of identifying with a special group or to prevent others from knowing what is being said.

One such case is Nushu, the women's secret writing of Chinese, which originated in the third century as a means for women to communicate with one another in the sexually repressive societies of imperial China (see exercise 19, Chapter 11). American slaves developed an elaborate code that could not be understood by the slave owners. References to 'the promised land' or the 'flight of the Israelites from Egypt' sung in spirituals were codes for the North and the Underground Railroad.

Language games, such as Pig Latin and Ubbi Dubbi (see exercise 10 and 11 at the end of the chapter), are used for amusement by children and adults. They exist in all the world's languages and take a wide variety of forms. In some, a suffix is added to each word; in others a syllable is inserted after each vowel (in Pig Latin *dog* is pronounced 'og-day', *parrot* as 'arrot-pay' and *elephant* may be 'elephant-may'). There are rhyming games and games in which phonemes are reversed. A game in Brazil substitutes an /i/ for all the vowels; Indian children learn a Bengali language game in which the syllables are reordered, as in pronouncing *bisri*, 'ugly', as 'sribi'. In Arrernte, an Arandic language of central Australia, children play a language game called Rabbit Talkin which the first consonant or consonant cluster and the preceding vowel are moved to the end of the word.

These language games provide evidence for the phonemes, words, morphemes, semantic features and so on that are posited by linguists for descriptive grammars. They also illustrate the boundless creativity of human language and human speakers.

CHAPTER REVIEW

Summary

Every person has their own individual way of speaking, called an idiolect. The language used by a group of speakers is called a dialect. The dialects of a language are the mutually intelligible forms of that language that differ in systematic ways from each other. Dialects develop and are reinforced because languages change and the changes that occur in one group or area may differ from those that occur in another. Regional dialects and social dialects develop for this reason and are reinforced as they are important symbols of identity.

Dialect differences include phonological or pronunciation differences (accents), vocabulary distinctions and syntactic differences. The differences between dialects are not as great as the similarities that are shared, therefore permitting speakers of different dialects to communicate with each other.

Australian English and New Zealand English are dialects of World English alongside British English and American English. While there is considerable accent variation within Britain and in North America, the English used in Australia is relatively geographically homogeneous, as is that in New Zealand (aside from a few minor phonological regionalisms). This homogeneity is usually explained in terms of the special melting-pot circumstances of the creation of the dialects.

In many countries, one dialect or dialect group is viewed as the standard, such as Mainstream Australian English. While this particular variety is not linguistically superior, it may be considered by some language purists to be the only correct form of the language. Such a view has led to the idea that some non-standard dialects are deficient. On the contrary, analysis of non-standard Englishes shows them to be as logical, complete, rule-governed and expressive as any other dialect.

In areas where many languages are spoken, one language may become a lingua franca to ease communication among people. In other cases, where traders, missionaries or travellers need to communicate with people who speak a language unknown to them, a pidgin may develop. A pidgin is a simplified system with properties of both the superstrate (lexifier) and substrate languages. When a pidgin is widely used and constitutes the primary linguistic input to children, it is *creolised*. The grammars of creole languages are similar to those of other languages, and languages of creole origin now exist in many parts of the world including the Top End of Australia, where a large proportion of the Australian Aboriginal population in the region use one of Kriol or Yumplatok.

The study of language has important implications for education especially regarding reading instruction and the teaching of second language learners, language-minority students and speakers of non-mainstream dialects. Several second-language teaching methods have been proposed for adult second language learners. Some of them focus more on the grammatical aspects of the target language, and others focus more on language use in the target language, with less regard for grammatical accuracy.

Writing and reading, unlike speaking and understanding, must be taught. Three methods of teaching reading have been used: whole-word, whole-language and phonics. In the whole-word and whole-language approaches, children are taught to recognise entire words without regard to individual letters and sounds. The phonics approach emphasises the spelling–sound correspondences of the language, and thus draws on the child's phonological knowledge. The phonics approach is the most successful for reading instruction.

Immigrant children to an English-speaking country must acquire English (or, if not an English-speaking country, the majority language of their new country). Bilingual education programs are designed to help achieve multiple aims by teaching children literacy and content material in their native language while they are acquiring English.

Besides regional and social dialects, speakers may use different styles or registers depending on the particular context of the interaction. Registers may also be associated with a particular profession, interest, recreation and so on. *Slang* is not often used in formal situations or formal writing but is widely used in speech. *Jargon* refers to the unique vocabulary used by professional or trade groups of people to facilitate communication. *Argot* is the informal jargon of a group. Both jargon and argot provide a means of bonding and may also exclude outsiders.

In all societies, certain acts or behaviours are frowned upon, forbidden or considered taboo. Language itself cannot be obscene or clean; the views concerning specific words or linguistic expressions reflect the attitudes of a culture or society towards the behaviours and actions of the language users. At times, slang words may be taboo whereas scientific or standard terms with the same meaning are acceptable in polite society. Taboo words and acts give rise to euphemisms, which are words or phrases that replace the expressions to be avoided.

Just as the use of some words may indicate society's views towards sex, natural bodily functions or religious beliefs, some words may also indicate racist, chauvinist or sexist attitudes. Language is not intrinsically racist or sexist but reflects the views of various sectors of a society. The availability of offensive terms, and particular grammatical peculiarities such as the lack of a genderless third-person singular pronoun, may perpetuate and reinforce biased views and be demeaning and insulting to those addressed. Therefore, culture influences language and, arguably, language may have an influence on the culture in which it is spoken.

The invention or construction of secret languages and language games like Pig Latin attest to human creativity with language and the unconscious knowledge that speakers have of the phonological, morphological, and semantic rules of their language.

Exercises

1 Two pronunciations are given for each of the following words, one representing a typical Australian English pronunciation (transcribed using the IPA symbols selected for Australian English the other representing a pronunciation found in another major dialect of world English (New Zealand English, British RP or Standard American English). State which pronunciation is most probably representative of a speaker of Australian English and identify the other as either New Zealand, British or American English.

a	braces	[bɹeɪsɪz]	[bɹæɪsəz]
b	dare	[deː]	[dɪə]
c	horrid	[hɒɹɪd]	[hɔɹəd]
d	fish	[fɪʃ]	[fɘʃ]
e	which	[ʍɪtʃ]	[wɪtʃ]
f	sock	[sɔk]	[sɑk]
g	bear	[beː]	[bɪə]
h	bird	[bɜɹd]	[bɜːd]
i	minister	[mɘnəstə]	[mɪnəstə]
j	hog	[hɔg]	[hɑg]

2 Some prescriptive grammarians would reject as incorrect a sentence such as *She's coming with you and I*. What would the prescriptive grammarians consider the 'correct' version and why would people produce the version given above?

3 Following is a passage from *The gospel according to St Mark* in Cameroon English Pidgin. See how much you are able to understand before consulting the English translation given. State some of the similarities and differences between Cameroon English Pidgin and Australian English.

a i Di fos tok fo di gud nuus fo Jesus Christ God yi Pikin.
ii I bi sem as i di tok fo di buk fo Isaiah, God yi nchinda (prophet), 'Lukam, mi a di sen man nchinda fo bifo yoa fes weh yi go fix yoa rud fan',
iii Di vos fo som man di krai fo bush: 'Fix di ples weh Papa God di go, mek yi rud tret'.

English translation
i The beginning of the gospel of Jesus Christ, the Son of God.
ii As it is written in the book of Isaiah the prophet, 'Behold, I send my messenger before thy face, which shall prepare thy way before thee'.
iii The voice of one crying in the wilderness, 'Prepare ye the way of the Lord, make his paths straight'.

b Here are some words from Tok Pisin. What are the English words from which they are derived? The answer is given for the first entry as an example.

Tok Pisin	Gloss	Answer
taim bilong kol	winter	time belong cold
pinga bilong fut	toe	
hamas krismas yu gat?	how old are you?	
kukim long paia	barbecue	
sapos	if	
haus moni	bank	
kamup	arrive	
tasol	only	
olgeta	all	
solwara	sea	
haus sik	hospital	
handet yia	century	

4 In the period from 1890 to 1904, *Slang and Its Analogues* by J S Farmer and W E Henley was published in seven volumes.[25] The following entries are included in this dictionary. For each item:

- **a** state whether the word or phrase exists in current Australian English
- **b** if not, state what the modern slang term would be if the word remains but its meaning has changed, and provide the modern meaning.
  - **i** *all out:* completely, as in 'All out the best' (the expression goes back to as early as 1300)
  - **ii** *to have apartments to let:* to be an idiot; one who is empty-headed
  - **iii** *been there:* as in 'Oh, yes, I've been there': applied to a man who is shrewd and who has had many experiences
  - **iv** *bellybutton:* the navel
  - **v** *berkeleys:* a woman's breasts
  - **vi** *bitch:* most offensive appellation that can be given to a woman, even more provoking than *whore*
  - **vii** *once in a blue moon*: extremely seldom
  - **viii** *boss:* master; one who directs
  - **ix** *bread:* employment (1785 – 'out of bread' = 'out of work')
  - **x** *to claim:* to steal
  - **xi** *to cut dirt:* to escape
  - **xii** *dog cheap:* of little worth (used in 1616 by Thomas Dekker: 'Three things there are dog-cheap, learning, poorman's sweat, and oathes')
  - **xiii** *funeral:* as in 'It's not my funeral' = 'It's no business of mine'
  - **xiv** *to get over:* to seduce, to fascinate
  - **xv** *groovy:* settled in habit; limited in mind
  - **xvi** *grub:* food
  - **xvii** *head:* toilet (nautical use only)
  - **xviii** *to hook:* to marry
  - **xix** *to hump:* to spoil
  - **xx** *hush money:* money paid for silence; blackmail
  - **xxi** *to itch:* to be sexually excited
  - **xxii** *jam:* a sweetheart or a mistress
  - **xxiii** *leg bags:* stockings
  - **xxiv** *to lie low:* to keep quiet; to bide one's time
  - **xxv** *to lift a leg over:* to have sexual intercourse
  - **xxvi** *looby:* a fool
  - **xxvii** *malady of France:* syphilis (used by Shakespeare in 1599)
  - **xxviii** *nix:* nothing
  - **xxix** *noddle:* the head

- xxx *old:* money (1900 – 'Perhaps it's somebody you owe a bit of the old to, Jack')
- xxxi *to pill:* to talk platitudes
- xxxii *pipe layer:* a political intriguer; a schemer
- xxxiii *poky:* cramped, stuffy, stupid
- xxxiv *pot: a quart*; a large sum; a prize; a urinal; to excel
- xxxv *puss-gentleman:* an effeminate

5 Suppose someone asked you to help compile items for a new dictionary of slang. List 10 slang words that you know and provide a short definition for each.

6 If the following questions were asked in a more informal style, what changes would you predict would occur?
- a To whom did you send the invitation?
- b This is an answer without which I would be lost.

7 Below are some words used in British or American English for which different words are usually used in Australian English. See if you can identify the word as British or American and give the Australian equivalent.
- a faucet
- b mortician
- c anorak
- d gas (fuel)
- e electric fire
- f dungarees
- g cookie
- h instalment buying
- i push-chair
- j saloon car
- k aubergine
- l fall (season)
- m estate car
- n monkey wrench
- o bobby
- p drugstore
- q sophomore
- r diaper
- s pullman car
- t vest
- u pacifier.

8 Identify a set of phrases and their meanings used within your own social group that do not have currency in the general community. Discuss how such phrases came into being, how they are used in your social circle and how they are regarded by those outside your social group. Consider whether and how such phrases could move into general use in the community.

9 Suppose someone said, 'We ain't goin' nowhere' and you heard someone reply, 'That's an illogical statement, since two negatives make a positive'. How would you argue with the corrector?

10 Pig Latin is a common language game of English, but even Pig Latin has dialects, forms of the language game with different rules.
- a Consider the following data from three dialects of Pig Latin, each with its own rule applied to words beginning with vowels.

	Dialect 1	Dialect 2	Dialect 3
eat	**/iːtmæɪ/** /itmeɪ/	**/iːthæɪ/** /itheɪ/	**/iːtæɪ/** /iteɪ/
arc	**/ɐːkmæɪ/** /akmeɪ/	**/ɐːkhæɪ/** /akheɪ/	**/ɐːkæɪ/** /akeɪ/

State the rule that accounts for the Pig Latin forms in each dialect. How would you say *honest*, *admire* and *illegal* in each dialect? Give the phonemic transcription of the Pig Latin forms.

b In one dialect of Pig Latin, the word *strike* is pronounced /ɑekstɹæɪ/ /aɪkstɹeɪ/ and in another it is pronounced /tɹɑeksæɪ/ /tɹaɪkseɪ/. In the first dialect, *slot* is pronounced /ɔtslæɪ/ /ɒtsleɪ/ and in the second it is pronounced /lɔtsæɪ/ /lɒtseɪ/.
   i State the rules for each of these dialects that account for these different Pig Latin forms of the same words.
   ii Give the phonemic transcriptions for *spot*, *crisis* and *scratch* in both dialects.

11 Thousands of language games such as Pig Latin exist in the world's languages. Below are some sentences representing different English language games. Write each sentence in its undistorted form and state the language-game rule.
   a /ɑe-əʉ tʊk-əʉ mɑe-əʉ dɔg-əʉ æɔt-əʉ sɑed-əʉ/
   /aɪ-oʊ tʊk-oʊ maɪ-oʊ dɒg-oʊ aʊt-oʊ saɪd-oʊ/
   b /hɪəli: ɪzli: əli: mo:li: kɔmli:pləli:kæɪtli:ədli: gæɪmli:/
   /hɪəli ɪzli əli məli kɒmlipləlikeɪtliədli geɪmli/
   c Mary-shmary can-shman talk-shmalk in-shmin rhyme-shmyme.
   d Betpetterper latepate thanpan nevpeverper.
   e thop-e fop-oot bop-all stop-a dop-i op-um blop-ew dop-own
   /ðɔpə fɔpʊt bɔpo:l stɔpæɪ dɔpi: ɔpəm blɔpʉ: dɔpæɔn/
   /ðɒpə fɒpʊt bɒpɔl stɒpeɪ dɒpi ɒpəm blɒpu dɒpaʊn/
   f /kɐbən jɐbʉ: spɐbi:k ðɐbɪs kɐbɑend ɐbəv ɐbɪŋlɐbɪʃ/
   /kʌbən jʌbu spʌbik ðʌbɪs kʌbaɪnd ʌbəv ʌbɪŋlʌbɪʃ/ (this sentence is in 'Ubbi Dubbi', taken from a children's television program popular in the 1970s).

12 Below are sentences that might be spoken between two friends chatting informally. For each, state what the non-abbreviated full sentence in Mainstream Australian English would be. In addition, state in your own words (or formally if you wish) the rule or rules that derived the informal sentences from the formal ones.
   a Watcha been doin' today?
   b Watcha gonna do now?
   c They's gone to school?
   d There's two apples here.
   e Wanna go with me?

13 Compile a list of (jargon) terms from some profession or trade (e.g. solicitor, musician, doctor, waterside worker and so forth). Give a definition for each term in non-jargon terms.

14 Provide an Australian translation of a well-known children's story (e.g. *Goldilocks and the Three Bears* or *Snow White and the Seven Dwarfs*) using as many slang terms and colloquial expressions as possible.

15 In column A are Australian rhyming slang expressions. Match these to the items in column B to which they refer.

	A		B
a	china plate	**i**	yank (American)
b	septic tank	**ii**	belly
c	ham and eggs	**iii**	Sydney
d	Ned Kelly	**iv**	spew
e	steak and kidney	**v**	road
f	Chunder Loo	**vi**	legs
g	frog and toad	**vii**	mate

Now construct your own version of Australian rhyming slang for the following words:

h	hair
i	mouse
j	boat
k	legs
l	whistle

16 Column A lists euphemisms for words in column B. Match each item in A with its appropriate B word.

	A		B
a	Montezuma's revenge	**i**	condom
b	joystick	**ii**	genocide
c	friggin'	**iii**	fire
d	ethnic cleansing	**iv**	diarrhoea
e	French letter (old)	**v**	masturbate
f	diddle oneself	**vi**	kill
g	holy of holies	**vii**	urinate
h	spend a penny (British)	**viii**	penis
i	ladies' cloakroom	**ix**	die
j	knock off (from 1919)	**x**	waging war
k	vertically challenged	**xi**	vagina
l	hand in one's dinner pail	**xii**	women's toilet
m	sanitation engineer	**xiii**	short
n	downsize	**xiv**	fuckin'
o	peacekeeping	**xv**	garbage collector

17 In a short essay, defend or criticise the following statement.
It is insensitive to say things like *There's a nip in the air or I've been in bed with a wog* because *nip* and *wog* resemble degrading, racist words.

18 Compile a list of expressions used in online communication that have made their way into everyday language (e.g. LOL).

19 Would a man or a woman be more likely to produce the sentence *Oh, it's so adorable!*? How do you know?

20 One sociolinguistic variable that has been studied is the reduction of 'ing' [ɪŋ] to 'in' produced as [ən] or [ɪn] (as in *'goin'* for *going* and *'comin'* for *coming*). Would you expect 'ing' reduction to occur more commonly among males or females? Why? Would you expect it to occur more commonly in formal styles or informal styles? Why?

21 Holmes provides the following examples of Tok Pisin expressions. Comment on the vocabulary-building methods used in this pidgin language. Comment too on the semantic extension of *gras* and *han*.

Tok Pisin	English
gras	grass
mausgras	moustache
gras bilong fes	beard
gras bilong hed	hair
gras antap long ai	eyebrow
gras nogut	weed
pisin	bird
gras bilong pisin	feather
han	hand
han bilong pisin	wing

22 Do an internet search for Tok Pisin. You will very quickly find websites where it is possible to hear Tok Pisin spoken. Listen to a passage several times. How much of it can you understand without looking at the text or the translation? Then follow along with the text (generally provided) until you can hear the individual words. Now try a new passage. Did your comprehension improve? How much practice do you think you would need before you could understand roughly half of what is being said the first time you heard it?

23 A language game is to take a word or (well-known) expression and alter it by adding, subtracting or changing one letter and supplying a new (clever) definition. Read the following examples, try to figure out the expression from which they are derived and then try to produce 10 on your own. (*Hint*: lots of Latin).

Cogito eggo sum	I think, therefore I am a waffle.
Foreploy	A misrepresentation about yourself for the purpose of getting laid.
Veni, vipi, vici	I came, I am important, I conquered.
Giraffiti	Dirty words sprayed very, very high.
Ignoranus	A person who is both stupid and an arsehole.
Felix navidad	Our cat has a boat.
Veni, vidi, vice	I came, I saw, I smoked.
Glibido	All talk, no action.
Haste cuisine	Fast French food.
L'état, c'est moo	I'm bossy around here.
Intaxication	The euphoria that accompanies a tax refund.
Ex post fucto	Lost in the mail.

24 In his original, highly influential novel *1984*, George Orwell introduces Newspeak, a government-enforced language designed to keep the masses subjugated. Orwell writes:

> Its vocabulary was so constructed as to give exact and often very subtle expression to every meaning that a Party member could properly wish to express, while excluding all other meanings and also the possibility of arriving at them by indirect methods. This was done partly by the invention of new words, but chiefly by eliminating undesirable words and by stripping such words as remained of unorthodox meanings, and so far as possible of all secondary meanings whatever. To give a single example. The word free still existed in Newspeak, but it could only be used in such statements as 'This dog is free from lice' or 'This field is free from weeds'. It could not be used in its old sense of 'politically free' or 'intellectually free', since political and intellectual freedom no longer existed even as concepts, and were therefore of necessity nameless.

Critique Newspeak. Will it achieve its goal? Why? (*Hint*: You may want to review concepts such as language creativity and arbitrariness as discussed in Chapter 1.)

25 In *1984*, George Orwell proposed that if a concept does not exist, it is nameless. In the passage quoted below, he suggests that if a crime were nameless, it would be unimaginable, hence impossible to commit:

> A person growing up with Newspeak as his sole language would no more know that ... free had once meant 'intellectually free', than, for instance, a person who had never heard of chess would be aware of the secondary meanings attaching to queen and rook. There would be many crimes and errors which it would be beyond his power to commit, simply because they were nameless and therefore unimaginable.

Critique this notion.

26 One aspect of different English genderlects is lexical choice. For example, women say *darling* and *lovely* more frequently than men; men use sports expressions such as *on par* and *slam dunk* more than women do. Think of other lexical usages that appear to be asymmetric between the sexes.

27 **Challenge exercise:** Throughout history many regimes have banned languages. Write a report in which you mention several such regimes, the languages they banned and possible reasons for banning them. For example, you might discover that the Basque language was banned in Spain under the regime of Francisco Franco owing in part to the separatist desires of the Basque people and because the Basques opposed his dictatorship.

28 Here are some examples of English used in newspaper headlines and elsewhere. Some examples follow:

ARDERN'S LOCKDOWN UNDER SCRUTINY
PENSIONER WINS LOTTERY
PRIME MINISTER UNDER FIRE
MAN DIES IN LANDSLIDE

Headlinese does not involve an arbitrary omission of parts of the sentence, it is regulated by grammatical rules.

a Translate each of these headlines into Australian English.
b What features or rules distinguish headlinese from Australian English?
c Are there other contexts (besides headlines) in which we find headlinese? If so, provide examples.

29 Watch a reality TV show. Write down any euphemisms you hear and the taboo subjects they conceal.

30 Recommend three ways in which society can act to preserve linguistic diversity. Be realistic and concrete.

31 Research the history and controversy surrounding the use of Australian Aboriginal languages and Māori language in education in Australia and New Zealand, respectively.

32 The Karen-speaking people of Myanmar claim that their languages – thought to be a Tibeto-Burman group of the Sino-Tibetan family of languages – are banned by the government of Myanmar (as of the year 2012). Research the assertion of this ethnic minority that their language is outlawed and offer evidence regarding the validity of this claim or its falsehood.

Further reading

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Weblinks

https://aiatsis.gov.au/explore/living-languages – The Australian Institute of Aboriginal and Torres Strait Islander Studies provides information on Indigenous Languages of Australia.

https://slll.cass.anu.edu.au/centres/andc – The Australian National Dictionary Centre conducts research into Australian English and provides Oxford University Press with editorial expertise for their Australian dictionaries.

https://www.mq.edu.au/research/research-centres-groups-and-facilities/healthy-people/centres/centre-for-language-sciences-clas/australian-voices – Australian Voices contains information about Australian English phonological history and variation

https://www.macquariedictionary.com.au/resources/word/map – This site lists words, phrases and expressions (from A to Z) used by different language groups in Australia.

https://www.bl.uk/british-accents-and-dialects – This is a useful resource that provides information regarding British accents and dialects.

https://www.firstlanguages.org.au – First Languages Australia brings together people and organisations around the country working to make sure that indigenous languages are not lost and that they continue to live on, strong and vibrant.

https://glottobank.org – Glottobank was established to document and understand the world's linguistic diversity. It contains five global databases documenting variation in language structure (Grambank), lexicon (Lexibank), paradigm systems (Parabank), numerals (Numeralbank), and phonetic changes (Phonobank).

http://www.dynamicsoflanguage.edu.au/about – The Centre of Excellence for the Dynamics of Language investigates how languages vary, how we learn them, how we process them and how they evolve.

https://lingroadshow.com – The Linguistics Roadshow is an interactive showcase about the science of language

http://www.ucl.ac.uk/english-usage/projects/ice.htm – At this site you can find information about the International Corpus of English, especially the million-word British contribution.

https://www.un.org/en/gender-inclusive-language – United Nations Gender Inclusive Language provides details of how to use language in a gender inclusive way.

Endnotes

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Language change: the syllables of time

10

> No language as depending on arbitrary use and custom can ever be permanently the same, but will always be in a mutable and fluctuating state; and what is deem'd polite and elegant in one age, may be accounted uncouth and barbarous in another.
>
> Benjamin Martin, lexicographer (1704–1782)

Learning objectives

After reading Chapter 10, you should be able to:

- understand the nature and possible causes of language change in the domains of phonology, morphology, syntax and semantics
- understand the principles of comparative reconstruction
- understand the status of extinct and endangered languages
- distinguish between different types of language classification, including the distinction between genetic and typological classification.

All living languages change with time. It is fortunate that they do so rather slowly because it would be inconvenient to have to relearn our native language every 20 years. As years pass we hardly notice any change, yet if we were to turn on a radio and miraculously receive a broadcast in our 'native language' from the year 1000, we would probably think we had tuned in to a foreign-language station.

Bereft of spoken recordings, we must consult written records to achieve a sense of language change. Many language changes are revealed in written records. We know a great deal of the history of English because it has been a written language for about 1000 years. Old English, spoken in England around the end of the first millennium, is scarcely recognisable as English. (Of course, our linguistic ancestors did not call their language Old English.) A speaker of Modern English would find the language unintelligible. Indeed, there are college courses in which Old English is studied as a foreign language.

A line from *Beowulf* illustrates why Old English must be translated:[1]

Wolde guman findan þone þe him on sweofote sare geteode.

He wanted to find the man who harmed him while he slept.

Approximately five hundred years after *Beowulf*, Chaucer wrote *The Canterbury Tales* in what is now called Middle English, which was spoken from around 1100 to 1500. It is more easily understood by present-day readers, as seen by looking at the opening of the tales:

Whan that Aprille with his shoures soote

The droght of March hath perced to the roote …

'When April with its sweet showers

The drought of March has pierced to the root …'

Two hundred years after Chaucer, in a language that can be considered an earlier form of Modern English, Shakespeare's Hamlet says:

A man may fish with the worm that hath eat of a king, and eat of the fish that hath fed of that worm.

The stages of English are Old English (449–1100 CE), Middle English (1100–1500) and Modern English (1500–present). This division is somewhat arbitrary, being marked by dates of events in English history, such as the Norman Conquest of 1066, the results of which profoundly influenced the English language.

The branch of linguistics that deals with how languages change, what kinds of changes occur and why they occur is called **historical and comparative linguistics**. It is 'historical' because it deals with the history of particular languages; it is 'comparative' because it deals with relations among languages.

historical and comparative linguistics
The branch of linguistics that deals with how languages change, what kinds of changes occur and why they occur.

Changes in a language are changes in the grammars of people who speak the language and are perpetuated as new generations of children acquire the altered language and make further changes. All components of the grammar are subject to change over the course of time. Although most of the examples in this chapter are from English, all languages change over time. This is true of sign languages as well as spoken languages. Like all living languages, Australian Sign Language (Auslan) continues to change. Not only have new signs entered the language over the past 200 years, but also the forms of the signs have changed in ways similar to the historical changes in spoken languages.

The regularity of sound change

> That's not a regular rule: you invented it just now.
>
> Lewis Carroll, *Alice's Adventures in Wonderland*, 1865

New Zealand offers a variety of surprises to its visitors, not the least of which is linguistic. If you visit Wellington in July, you will no doubt hear references to the cold winter 'ear' and to the 'beer' branches on the trees. What you are hearing is a dialectal difference in phonology, sometimes called an accent (see Chapter 9). Those New Zealanders who speak this dialect (which is not restricted to Wellington) pronounce words such as *air*, *bare* and *mayor* with the /ɪə/ diphthong, whereas Australians use /eː/ /ɛə/. This correspondence between these two dialects is an example of a **regular sound correspondence**; when /eː/ /ɛə/ occurs in a word in Australian English, /ɪə/ occurs in New Zealand English.

regular sound correspondence
The occurrence of different sounds in the same position of the same word in different languages or dialects, with this parallel holding for a significant number of words (e.g. /ɐː/ in Australian English corresponds to /æ/ in American English in words like *path* and *glass*); also found between newer and older forms of the same language.

The different pronunciations of *air*, *bare* and so on did not always exist in English. This chapter will discuss how such dialectal differences arose and why the sound differences are usually regular and not confined to just a few words. We will also consider changes that occur in other parts of the grammar and in the lexicon.

Sound correspondences

In Middle English, a *mouse* was called a *mus*, which sounded like *moose*, and this *mus* may have lived in someone's *hus* [huːs], the way *house* was pronounced at that time. In general, Middle English speakers used [uː] where many speakers of standard British English now use [aʊ] ([æɔ] in Australian English). Therefore *out* was pronounced [uːt], *south* was pronounced [suːθ] and so on. Many such regular correspondences show the relation of older and newer forms of English.

The regular sound correspondences we observe between older and modern forms of a language are the result of phonological changes that affect certain sounds, or classes of sounds, rather than individual words. Centuries ago English underwent a phonological change called a **sound shift** in which [uː] became [aʊ] and which has changed further in various dialects.

sound shift
Historical phonological change.

Phonological changes can also account for dialect differences. At an earlier stage of American English a sound shift of [aɪ] to [aː] took place among certain speakers in the southern region of the US. The change did not spread beyond the South because the region was somewhat isolated. Many dialect differences in pronunciation result from sound shifts whose spread is limited.

Regional dialect differences may also arise when innovative changes occur everywhere but in a particular region. The regional dialect may be conservative relative to other dialects.

Ancestral protolanguages

Many modern languages were first regional dialects that became widely spoken and highly differentiated, finally becoming separate languages. The Romance languages, such as French and Spanish, were once dialects of Latin spoken in the Roman Empire. There is nothing degenerate about regional pronunciations. They result from natural sound changes that occur wherever human language is spoken.

In a sense, the Romance languages are the offspring of Latin, their metaphorical parent. Because of their common ancestry, the Romance languages are **genetically related**. Early forms of English and German, too, were once dialects of a common ancestor called **Proto-Germanic**. A **protolanguage** is the ancestral language from which related languages have developed. Both Latin and Proto-Germanic were descendants of an older language called **Indo-European**, or **Proto-Indo-European**.

genetically related
Describes two or more languages that developed from a common, earlier language, e.g. French, Italian and Spanish, which all developed from Latin.

Proto-Germanic
The name given by linguists to the language that was an ancestor of English, German and other Germanic languages.

protolanguage
The first identifiable language from which genetically related languages developed.

Indo-European / Proto-Indo-European
The descriptive name given to the ancestor language of many modern language families, including Germanic, Slavic and Romance.

Protolanguages are not actually attested languages but are hypothesised by linguists to explain the relationships between existing languages. Thus, Germanic languages, such as English and German, are genetically related to the Romance languages, such as French and Spanish. All these important national languages were once regional dialects.

How do we know that the Germanic and Romance languages have a common ancestor? One clue is the large number of sound correspondences. If you have studied a Romance language, such as French or Spanish, you may have noticed that where an English word begins with *f*, the corresponding word in a Romance language often begins with *p*, as shown in the following examples:

English /f/	French /p/	Spanish /p/	Italian /p/
father	père	padre	padre
fish	poisson	pescado	pesce

This /f/–/p/ correspondence is another example of a regular sound correspondence. There are many such correspondences between the Germanic and Romance languages; their prevalence cannot be explained by chance. What, then, accounts for them? A reasonable guess is that a common ancestor language used a *p* in words for *fish*, *father* and so on. We posit a /p/ rather than an /f/ because more languages show a /p/ in these words.

At some point, speakers of this language separated into two groups that lost contact with each other. In one of the groups, a sound change of $p \rightarrow f$ took place. The language spoken by this group eventually became the ancestor of the Germanic languages. This ancient sound change left its trace in the *f*–*p* sound correspondence that we observe today, as illustrated in the following diagram:

Indo-European /p/

Latin /p/   Proto-Germanic /f/

French /p/   Spanish /p/ . . .   English /f/   German /f/ . . .

Phonological change

> Etymologists … for whom vowels did not matter and who cared not a jot for consonants.
>
> Voltaire (1694–1778)

Regular sound correspondences illustrate changes in the phonological system. In earlier chapters we discussed speakers' knowledge of their phonological system, including knowledge of the phonemes and phonological rules of the language. Both aspects of the phonology are subject to change.

The velar fricative /x/ is no longer part of the phonemic inventory of most Modern English dialects. *Night* used to be pronounced [nɪxt] and *drought* was pronounced [druxːt]. This phonological change – the loss of /x/ – took place between the times of Chaucer and Shakespeare. All words once pronounced with an /x/ no longer include this sound. In some cases it disappeared altogether, as in *night* and *light*. In other cases the /x/ became a /k/, as in *elk* (Old English *eolh* [ɛɔlx]). In yet other cases it disappeared to be replaced by a vowel, as in *hollow* (Old English *holh* [hɔlx]). Dialects of Modern English spoken in Scotland have retained the /x/ sound in some words, such as *loch* [lɔx], meaning 'lake'.

These examples show that languages can lose phonemes over time. They can also add phonemes. Old English did not have the phoneme /ʒ/ of *leisure* [leʒə] [lɛʒə]. Through a process of palatalisation – a change in place of articulation from alveolar towards the palatal region – certain occurrences of /z/ were pronounced [ʒ]. Eventually, the [ʒ] sound became a phoneme in its own right, reinforced by the fact that it occurs in French words familiar to many English speakers, such as *azure* [æʒə].

An allophone of a phoneme may, through sound change, become a separate phoneme, therefore adding to the phonemic inventory. Old English lacked a /v/ phoneme. The phoneme /f/, however, had the allophone [v] when it occurred between vowels. Therefore *ofer*, meaning 'over', was pronounced [ɔvər] in Old English.

Old English also had a long consonant phoneme /fː/ that contrasted with /f/ between vowels. The name *Offa* /ofːa/ was pronounced [ɔfːa]. A sound change occurred in which the pronunciation of /fː/ was simplified to [f]. Now /fː/ was pronounced [f] between vowels so it contrasted with [v]. This made it possible for English to have minimal pairs involving [f] and [v], such as *feel* and *veal*. Speakers therefore perceived the two sounds as separate phonemes, in effect creating a new phoneme /v/.

Similar changes occur in the history of all languages. Neither /ʧ/ nor /ʃ/ were phonemes of Latin, but /ʧ/ is a phoneme of modern Italian and /ʃ/ is a phoneme of modern French, both of which evolved from Latin. In American Sign Language many signs that were originally formed at the waist or chest level are now produced at a higher level near the neck or upper chest, a reflection of changes in the 'phonology'.

Therefore in language change, phonemes may be lost (/x/) or added (/ʒ/), or result from a change in the status of allophones (the [v] allophone of /f/ becoming the phoneme /v/).

Phonological rules

An interaction of phonological rules may result in changes in the lexicon. The nouns *house* and *bath* were once differentiated from the verbs *house* and *bathe* by the fact that the verbs ended with a short vowel sound. Furthermore, the same rule that realised /f/ as [v] between vowels also realised /s/ and /θ/ as the allophones [z] and [ð] respectively between vowels. This general rule added voicing to intervocalic fricatives. Therefore the /s/ in the verb *house* was pronounced [z] and the /θ/ in the verb *bathe* was pronounced [ð].

Later a rule was added to the grammar of English deleting unstressed short vowels at the end of words (even though the final vowel still appears in the written words). A contrast between the voiced and voiceless fricatives resulted, and the new phonemes /z/ and /ð/ were added to the phonemic inventory. The verbs *house* and *bathe* were now represented in the mental lexicon with final voiced consonants.

Eventually, both the unstressed vowel deletion rule and the intervocalic-voicing rule were lost from the grammar of English. The set of phonological rules can change by both addition and loss of rules.

Changes in phonological rules can, and often do, result in dialect differences. In the previous chapter we discussed the addition of an *r*-dropping rule in English (/ɹ/ is not pronounced unless followed by a vowel) that did not spread throughout the language. Today, we see the effect of that rule in the *r*-less pronunciation of most varieties of English. The rule was added to the grammar from the seventeenth century; colonies that were settled after that time now speak *r*-less dialects (e.g. Australian English and New Zealand English); other areas, such as most of the US, retain the older pronunciation.

From the standpoint of the language as a whole, phonological changes occur gradually over the course of many generations of speakers, although a given speaker's grammar may or may not reflect the change. The changes are not planned any more than we are presently planning what changes will take place in English by the year 2300. In a single generation, changes are evident only through dialect differences.

The Great Vowel Shift

A major change in English that resulted in new phonemic representations of words and morphemes took place approximately between 1400 and 1600. It is known as the **Great Vowel Shift**. The seven long, or tense, vowels of Middle English underwent the change shown in **Table 10.1**.

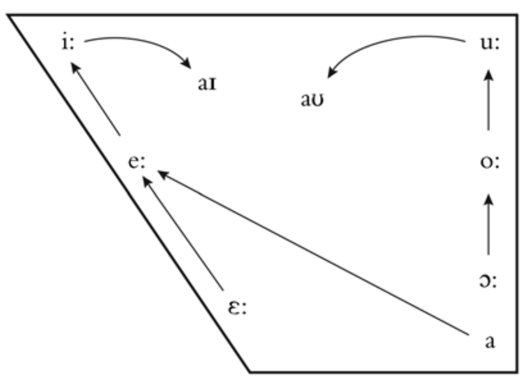
Great Vowel Shift
A sound change that took place in English some time between 1400 and 1600 CE in which seven long vowel **phonemes** were changed.

Table 10.1 **The Great Vowel Shift: changes to long vowels of Middle English**

Shift			Example			
Middle English	→	Modern British English	Middle English	→	Modern British English	Gloss
[iː]	→	[aɪ]	[miːs]	→	[maɪs]	*mice*
[uː]	→	[aʊ]	[muːs]	→	[maʊs]	*mouse*
[eː]	→	[iː]	[geːs]	→	[giːs]	*geese*
[oː]	→	[uː]	[goːs]	→	[guːs]	*goose*
[ɛː]	→	[eɪ]	[brɛːken]	→	[breɪk]	*break*
[ɔː]	→	[oʊ]	[brɔːken]	→	[broʊk]	*broke*
[aː]	→	[eɪ]	[naːmə]	→	[neɪm]	*name*

By diagramming the Great Vowel Shift on a vowel chart (**Figure 10.1**), we can see that the high vowels [iː] and [uː] became the diphthongs [aɪ] and [aʊ] respectively, while the long vowels underwent an increase in tongue height, as if to fill in the space vacated by the high vowels. In addition, [aː] was fronted to become [eɪ].

Figure 10.1 **The Great Vowel Shift**



These changes are among the most dramatic examples of regular sound shift. The phonemic representation of many thousands of words changed. Today, some reflection of this vowel shift is seen in the alternating forms of morphemes in English: *please – pleasant*, *serene – serenity*, *sane – sanity*, *crime – criminal*, *sign – signal* and so on. Before the Great Vowel Shift, the vowels in each pair were pronounced the same. Then the vowels in the second word of each pair were shortened by the **Early Middle English vowel shortening** rule. As a result, the Great Vowel Shift, which occurred later and applied only to long vowels, affected only the first word in each pair. This is why the vowels in the morphologically related words are pronounced differently today, as shown in **Table 10.2**.

Early Middle English vowel shortening
A sound change that shortened vowels such as the first *i* in *criminal*. As a result *criminal* was unaffected by the **Great Vowel Shift**, leading to word pairs such as *crime/criminal*.

Table 10.2 Effect of vowel shift on Modern English

Middle English vowel	Shifted vowel	Short vowel	Word with shifted vowel	Word with short vowel
ī	ɑe aɪ	ɪ	divine	divinity
ū	æɔ aʊ	ʊ	profound	profundity
ē	iː i	e	serene	serenity
ō	ʉː u	ɔ ɒ	fool	folly
ā	æɪ eɪ	æ	sane	sanity

The Great Vowel Shift is a primary source of many of the spelling inconsistencies of English because our spelling system still reflects the way words were pronounced before it occurred. In general, the written language is more conservative, that is, slower to change, than the spoken language.

Morphological change

> And is he well content his son should find
> No nourishment to feed his growing mind
> But conjugated verbs and nouns declin'd?
>
> William Cowper, *Tirocinium*, 1785

Like phonological rules, rules of morphology may be lost, added or changed. We can observe some of these changes by comparing older and newer forms of the language or by looking at different dialects.

case endings
Suffixes on the noun based on its grammatical function, such as *'s* of the English genitive case indicating possession, e.g. *Robert's sheepdog*.

Extensive changes in morphology have occurred in the history of the Indo-European languages. Latin had **case endings** – suffixes on the noun based on its thematic role or grammatical relationship to the verb. These are no longer found in the Romance languages. (See Chapter 6 for a more extensive discussion of thematic roles; the terms used by historical linguists are somewhat different than those used by modern semanticists.) The following is a **declension**, or list of cases, for the Latin noun *lupus*, 'wolf':

declension
A list of the inflections or cases of nouns, pronouns, adjectives and determiners in categories such as grammatical relationship, number and gender.

Noun	Noun stem	Case ending	Case	Example
lupus	lup +	us	nominative	*The wolf* runs.
lupī	lup +	ī	genitive	A sheep in *wolf's* clothing.
lupō	lup +	ō	dative	Give food *to the wolf*.
lupum	lup +	um	accusative	I love *the wolf*.
lupō	lup +	ō	ablative	She walked *with the wolf*.
lupe	lup +	e	vocative	*Wolf*, come here!

In *Alice's Adventures in Wonderland*, Lewis Carroll has Alice give us a brief lesson in grammatical case. Alice has become very small and is swimming around in a pool of her own tears with a mouse that she wishes to befriend:

> 'Would it be of any use, now,' thought Alice, 'to speak to this mouse? Everything is so out-of-the-way down here, that I should think very likely it can talk: at any rate, there's no harm in trying.' So she began: 'O Mouse, do you know the way out of this pool? I am very tired of swimming about here, O Mouse!' (Alice thought this must be the right way of speaking to a mouse: she had never done such a thing before, but she remembered having seen in her brother's Latin Grammar, 'A mouse-of a mouse-to a mouse-a mouse-O mouse!')

Alice's examples are the English equivalents of the nominative, genitive, dative, accusative and vocative cases that existed in Latin and in Old English but not in modern English, where word order and prepositions convey the same information.

Ancient Greek and Sanskrit also had extensive case systems expressed morphologically through noun suffixing, as did Old English, as illustrated by the following noun forms:

Case	OE singular		OE plural	
nominative	stãn	stone	stãnas	stones
genitive	stãnes	stone's	stãna	stones
dative	stãne	stone	stãnum	stones
accusative	stãn	stone	stãnas	stones

Lithuanian and Russian retain much of the early Indo-European case system, but changes have all but obliterated it in most modern Indo-European languages.

English retains the genitive case, which is written with an apostrophe *s*, as in *Robert's dog*, but that is all that remains as far as possessives are concerned. Pronouns retain a few more traces: *he/she* are nominative, *him/her* accusative and dative, and *his/hers* genitive. And, of course, English (barely) retains the *who/whom* distinction, much beloved by English teachers, reflecting nominative and non-nominative cases.

English has replaced its depleted case system with an equally expressive system of prepositions. For example, the dative case is often indicated by the preposition *to* and the genitive case by the preposition *of*. A noun occurring after a verb (V NP) with no intervening preposition is often in the accusative case.

Syntactic change

> Understanding changes in grammar is a key component in understanding changes in language.
>
> David Lightfoot, *The Development of Language*, 1999

When we see a word-for-word translation of older forms of English, we are most highly struck by the differences in word order. Consider again the opening lines of *The Canterbury Tales*, this time translated word-for-word:

Whan that Aprille with his shoures soote

'When that April with its showers sweet'

The droght of March hath perced to the roote ...

'The drought of March has pierced to the root ...'

In Modern English, adjectives generally precede the nouns they modify, therefore we would say *sweet showers* in place of *showers sweet*. Moreover, direct objects generally follow their verb so that *has pierced the drought of March to the root* would be a modern rendering of the second line. Thus, the rules of syntax that govern these word orders, even taking 'poetic licence' into account, appear to have changed. It is safe to say that syntactic change in English and other languages is most evident in the changes of permitted word orders.

Syntactic change in English is a good illustration of the interrelationship of the various modules of the grammar. And conversely, there is evidence that changes in syntax may very well have precipitated changes in the other two systems. These interrelations between the different components of grammar are complex. It is not always easy for historical linguists to determine which part of the grammar affected which other part and when. As in nearly all subfields of linguistics, much more research is needed to solve the many outstanding questions.

When the rich system of case endings of Old English became simplified, in part because of phonological changes, speakers of English were forced to rely more heavily on word order to convey the function of noun phrases. A sentence such as:

sē	man	þone	kyning	sloh
the (nominative)	man	the (accusative)	king	slew

was understood to mean 'the man slew the king'. Because of the case of the noun phrases, there would have been no confusion as to who did what to whom.

In addition, in earlier stages of English the verb had a richer system of subject–verb agreement. For example, the verb *to sing* had the following forms: *singe* (I sing), *singest* (you sing), *singeth* (he sings) and *singen* (we, plural you, they sing). It was therefore also possible in many cases to identify the subject on the basis of verb inflection even if it was not apparent from word order, which was already evolving from the subject–object–verb (SOV) word order of the example to the now more usual subject–verb–object (SVO).

In Modern English, the only marker of agreement is the third-person singular *-s* in *he sings*. Therefore, in Modern English *the man the king slew* is only grammatical as a relative clause meaning 'the man who(m) the king slew', with the subject and object of *slew* reversed. To convey the meaning 'the man slew the king', Modern English speakers must rely on word order– SVO – or other syntactic devices, such as ones that generate sentences like *It was the king who(m) the man slew*.

The change in English word order reflects a change in the rules of grammar. In Old English, the verb came last in the basic verb phrase as it does today in Dutch and German. But English alone underwent a change that made the verb come first in the verb phrase. As a result, Modern English has a basic SVO word order whereas Old English (and modern Dutch and German) have a basic SOV word order.

However, Modern English still has remnants of the original SOV word order in 'old-fashioned' kinds of expressions, such as *I thee wed*. Word order and morphological distinctions, dancing as partners through time, affected each other – word order became more rigid at the same time that morphological distinctions were vanishing.

As discussed in Chapter 5, in today's English we form questions by moving an auxiliary verb, if there is one, before the NP subject:

Can the girl kiss the boy?

Will the girl kiss the boy?

Has the girl kissed the boy yet?

Was the girl kissing the boy when you arrived?

However, if an auxiliary verb is absent, Modern English requires the word *do* to support the tense of the sentence:

Does the girl kiss the boy often?

*Kisses the girl the boy often?

Older forms of English had a more general rule that moved the first verbal element in the VP to precede the NP subject, even if it were a main verb. The question:

Kisses the girl the boy often?

was grammatical in English through the time of Shakespeare (e.g. *Goes Fleance with you?*, Macbeth, III, 1). This more general verb movement rule still exists in languages such as Dutch and German. In English, however, the rule of question formation changed, as indicated above; now only auxiliary verbs move and if no auxiliary verb is present, a *do* fills its role. This rule change interacted with the English case system. In Old English, *the girl* and *the boy* would have been marked for case, so there was no possibility of misunderstanding who was kissing whom. In effect, the sentence would be:

Kisses the (nominative) girl the (accusative) boy often?

Old English provides another example of how syntax influences morphology with its case endings on nouns that follow prepositions. In Old English, certain prepositions 'governed' certain cases:

Old English	Modern English
in þæt hūs (accusative, singular)	'into that house'
fram þæm hūse (dative, singular)	'from that house'
til þæs hūses (genitive, singular)	up to/as far as that house'

Since the meaning was already conveyed by the preposition, the case endings on *that* and *house* became redundant and therefore, over generations, no longer were pronounced.

Another syntactic change in English affected the rules of comparative and superlative constructions. Today we form the comparative by adding *-er* to the adjective or by inserting *more* before it; the superlative is formed by adding *-est* or by inserting *most*. In Malory's *Tales of King Arthur*, written in 1470, double comparatives and double superlatives occur, which today are ungrammatical, such as, *more gladder*, *more lower*, *moost royallest*, *moost shamefullest*.

Here is another interesting little change in syntactic rules. Both Old English and Middle English permitted split genitives, that is, possessive constructs in which the words that describe the possessor occur on both sides of the head noun:

Inwæres	broþur	ond	Healfdenes (Old English)
Inwær's	brother	and	Healfden's

Inwær's and Healfden's brother

The wife's tale of Bath (Middle English)

The wife of Bath's tale.

Modern English does not permit such structures, but it does permit rather complex genitive expressions to precede the head noun:

<u>The man with the two small children's</u> hat.

<u>The girl whose sister I'm dating's</u> roommate.

<u>When does you guys'</u> party begin? (cf. When does your (pl.) party begin?)

Because they do not occur in written records, we can infer that expressions such as *the Queen of England's crown* were ungrammatical in earlier periods of English. The title *The wife's tale of Bath* (rather than *The wife of Bath's tale*) in *The Canterbury Tales* supports this inference.

Modern Brazilian Portuguese (BP) may illustrate one such intermediate stage of language change. Until the middle of the nineteenth century, speakers of BP did not need to explicitly mention a subject pronoun because that information came from the person and number agreement on the verb, as illustrated for the verb *cozinhar*, 'to cook':

cozinh**o**	I cook	cozinh**amos**	we cook
cozinh**as**	you cook		
cozinh**a**	he/she cooks	cozinh**am**	they/you (pl.) cook

At that time speakers dropped subjects in about 80 per cent of their sentences, as in the second sentence of the following example:

A	Clara	sabe	fazer	tudo	muito	bem.
the	Clara	knows how	to do	everything	very	well.
Cozinha	que	é	uma	maravilha.		
cooks (3rd per.)	that	is	a	marvel		

Clara knows how to do everything well. She cooks wonderfully.

By the end of the twentieth century, subject-drop was reduced to 20 per cent and the agreement endings were also reduced. In certain dialects only a two-way distinction is maintained; first-person singular is marked with -*o*, as in *cozinho*, and all other grammatical persons are marked with -*a*. While sentences without subjects are still grammatical in European Portuguese (spoken in Portugal), they are ungrammatical for most speakers of Modern BP, which requires the expression of an overt subject, for example *ela*, 'she', as follows:

A Clara sabe fazer tudo muito bem. Ela cozinha que é uma maravilha.

Lexical change

Changes in the lexicon also occur. Among them are changes in the syntactic categories of words (i.e. their 'parts of speech'), addition of new words, the 'borrowing' of words from another language, the loss of words and the shift in the meaning of words over time. The word *menu* is ordinarily used only as a noun but some people use it as a verb, as in being asked in a restaurant, 'Have you been menued yet?' If speakers adopt this usage, *menu* will take on the additional lexical category of verb in their mental lexicons.

Such changes are common and are often put into effect in special usage situations. The noun *window* is used as a verb by carpenters as in, *Tomorrow we have to window the upper storey*, where *to window* means 'to put window frames in a house under construction'. Recently, in the US, a radio announcer said that Congress was *to-ing and fro-ing* on a certain issue, to mean 'wavering'. This strange compound verb is derived from the adverb *to and fro*. In British English, *hoover* is a verb meaning 'to vacuum up', derived from the proper noun *Hoover*, the name of a vacuum cleaner manufacturer. Now when we search on the internet, we *google*, a verb derived from the company name *Google*. American police *Mirandise* the people they arrest, meaning to read them their rights according to the Miranda rule. The judicial ruling was made in 1966, so we have a complete history of how a proper name became a verb. More recently the noun *text* has been 'verbed' and means 'to communicate by text message', and even more recent is the hijacking of the verb *twitter* and 'Proper Noun-ing' it as the name of a social networking and microblogging service.

Addition of new words

> And to bring in a new word by the head and shoulders, they leave out the old one.
>
> Montaigne (1533–1592)

One of the most obvious ways a language changes is through the addition of new words. Unlike grammatical change, which may take generations to notice, new words are readily apparent. Societies often require new words to describe changes in technology, sports, entertainment and so on. Languages are accommodating and inventive in meeting these needs.

In Chapter 4 we discussed some ways in which new words are born, such as through derivational processes, back-formations and compounding. There are other ways that words may enter the vocabulary of a language, therefore adding to the inventory of lexical items. These include out-and-out **word coinage**, deriving words from names, blending words to form new words, shortening old words to form new ones, forming acronyms, and borrowing words from other languages.

word coinage
The construction and/or invention of new words that then become part of the lexicon.

Word coinage

We have seen that new words may be added to the vocabulary of a language by derivational processes. New words also enter a language in a variety of other ways. Some are created outright to fit some purpose. Industry has added many words to English, such as *Kodak*, *nylon*, *Orlon* and *Dacron*. Specific brand names, such as *Xerox*, *Band-Aid, Kleenex*, *Textas, GladWrap* and *Vaseline*, are now sometimes used as the generic name for different brands of these types of products. Notice that some of these words were created from existing words (e.g. *Kleenex* from the word *clean*).

The sciences have given us a raft of newly coined words over the ages. Words such as *asteroid, neutron, genome, krypton, pterodactyl* and *vaccine* were created to describe the objects or processes arising from scientific investigation. A word so (relatively) new that its spelling is still in doubt is *dot-com*, also seen in magazines as *.com, dot.com*, and even *dot com* without the hyphen. It means 'a company whose primary business centres on the internet'. Greek roots introduced into English have also provided a means for coining new words. *Thermos*, 'hot', plus *metron*, 'measure', gives us *thermometer*. If you have an intense and all-consuming horror of cats you have *aílurophobia* from *aílouros* 'cat' and phóbos 'fear'.

Latin, like Greek, has also provided prefixes and suffixes that are used productively with both native and non-native roots. The prefix *ex-* comes from Latin:

ex-husband	ex-wife	ex-sister-in-law

The suffix *-able/-ible*, which was discussed earlier, is also Latin, borrowed via French, and can be attached to almost any English verb, as we noted and as further illustrated in:

writable	readable	answerable	movable

Even new bound morphemes may enter the language. The prefix *e-*, as in *e-commerce*, *e-mail*, and *e-trade*, meaning 'electronic', is barely two decades old, and most interestingly has given rise to the prefix *s-* as in *s-mail* to contrast with *e-mail*. The suffix *-gate*, meaning 'scandal', which was derived from the Watergate scandal of the 1970s in the US, may now be suffixed to a word to convey that meaning. Thus, *Dianagate*, a British usage, refers to a scandal involving wiretapped conversations of the then Princess of Wales, and Qatar-*gate*, a reference to unethical practices in the awarding of the soccer (football) World Cup locale in 2022.

Finally, there are occasions when signers need to represent a word or concept for which there is no sign. For such cases, Auslan may conceive a series of new hand shapes and movements, but absent this possibility, letters of the English alphabet may be expressed through finger spelling to convey any meaning that might be written.

Words from names

Eponyms are words that are coined from proper names and are another of the many creative ways that the vocabulary of a language expands. For example, our favourite lunch food was named for the fourth Earl of Sandwich, who put his food between two slices of bread so that he could eat while he gambled. And the favourite material of our work clothes is *denim*, named for a kind of cloth originally imported *de Nîmes* ('from Nîmes') a city in France. If you like olives, be sure and get the *jumbo* size, the name of an elephant brought to the United States for a circus. ('Jumbo olives' need not be as big as an elephant, however.)

Blends

Blends are similar to compounds in that they are produced by combining two words, but parts of the words that are combined are deleted, so they are 'less than' compounds. *Smog*, from *smoke* + *fog*; *brunch* from *breakfast* + *lunch*; *motel* from *motor* + *hotel*; *infomercial* from *information* + *commercial* and *urinalysis* from *urine* + *analysis* are examples of blends that have attained full lexical status in English. *Podcast* (*podcasting*, *podcaster*) is a new word meaning 'internet audio broadcast', which recently joined the English language as a blend of *iPod* and *broadcast*. Some more recent blends that are younger than most of our readers include *bromance* (a blend of 'brother' and 'romance' meaning a nonsexual relationship between two men), *locavore* (someone who eats locally sourced foods), *frenemy* (an enemy who pretends to be a friend), *staycation* (a vacation at home), *chillax* (be calm and relaxed), and *sexting* (sending text messages with sexual content).

Lewis Carroll's *chortle*, from *chuckle* + *snort*, has achieved limited acceptance in English. Carroll is famous for the coining and the blending of words. In *Through the Looking-Glass* he describes the 'meanings' of the made-up words in 'Jabberwocky' as follows:

> 'Brillig' means four o'clock in the afternoon – the time when you begin broiling things for dinner … 'Slithy' means 'lithe and slimy' … You see it's like a portmanteau – there are two meanings packed up into one word … 'Toves' are something like badgers – they're something like lizards – and they're something like corkscrews … also they make their nests under sun-dials – also they live on cheese … To 'gyre' is to go round and round like a gyroscope. To 'gimble' is to make holes like a gimlet. And 'the wabe' is the grass-plot round a sun-dial … It's called 'wabe' … because it goes a long way before it and a long way behind it … 'Mimsy' is 'flimsy and miserable' (there's another portmanteau … for you).

Carroll's 'portmanteaus' are what we have called blends and such words can become part of the regular lexicon.

Reduced words

abbreviation
The shortened form of a word.

clipping
The deletion of some part of a longer word to give a shorter word with the same meaning, e.g. *phone* from *telephone*.

Speakers tend to **abbreviate** words in various ways to shorten the messages they convey. This is seen dramatically in the creativity used in messages typed into mobile phones in instant messaging and similar communication technologies. Here, we will concern ourselves with *spoken* language and observe three reduction phenomena: *clipping*, *acronyms* and *alphabetic abbreviations*.

Clipping is the abbreviation of longer words into shorter ones, such as *fax* for *facsimile*; *telly*, the British word for *television*; *flu* for *influenza*, *porn* for *pornography*, and *droid* for *android*. Once marginalised as slang, these words have now become lexicalised, that is, full words in their own right. Clippings may clip the beginning of a word (*phone* for *telephone*), the end of a word (*auto* for *automobile*), or both ends (*fridge* for *refrigerator*).

There are two possible semantic outcomes of clipping. The most common by far is that the clipped word has the same meaning as its source. All of the examples in the previous paragraph are of that ilk. In a minority of instances, the clipped word takes on a different meaning. *Fan*, *van*, and *rad* are clipped from *fanatic*, *caravan*, and *radical*, but *fans* are not (generally) fanatics except at English football matches. Van is a single vehicle not a cavalcade, and something that is rad is marvellous though not necessarily radical. The use of *droid* to mean a certain kind of smartphone (itself a recent word) has a different meaning than *android*, though the use of the word is intended to convey robotic intelligence.

Clippings continue to come into existence. *Dis*, once rapper slang for *disrespect*, is gaining acceptance with the meaning 'show contempt for.' *Blog* (from *weblog*, another new word!) is perhaps the most successful clip of the current millennium, being today both a noun and a verb with all the related morphology (*blogs, blogging, blogged, blogger*, etc.).

Acronyms are words derived from the initials of several words. Such words are pronounced as the spelling indicates: NASA from National Aeronautics and Space Administration, UNESCO from United Nations Educational, Scientific, and Cultural Organization and UNICEF from United Nations International Children's Emergency Fund. *Radar* from *ra*dio *d*etecting *a*nd *r*anging, *laser* from *l*ight *a*mplification by *s*timulated *e*mission of *r*adiation, *scuba* from *s*elf-*c*ontained *u*nderwater *b*reathing *a*pparatus and RAM from *r*andom *a*ccess *m*emory show the creative efforts of word coiners, as does *snafu*, which was coined by soldiers in the Second World War and is rendered in polite circles as *s*ituation *n*ormal, *a*ll *f*ouled *u*p. Other notable additions include AIDS (1980s) from the initials of *a*cquired *i*mmune *d*eficiency *s*yndrome and SARS (2000s) from *s*evere *a*cute *r*espiratory *s*yndrome, and the current (at the time of writing) pandemic, COVID-19 from *co*rona *vi*rus *d*isease (20*19*).

acronym
A word composed of the initials of several words, e.g. *PET scan* from *p*ositron *e*mission *t*omography scan.

When the string of letters is not easily pronounced as a word, the acronym is produced by sounding out each letter, as in AFL for *A*ustralian *F*ootball *L*eague, UNSW for *U*niversity of *N*ew *S*outh *W*ales and MRI for *m*agnetic *r*esonance *i*maging. These special kinds of acronyms are sometimes called **alphabetic abbreviations**. With the proliferation of computers and widespread use of the internet, acronyms and alphabetic abbreviations are being added to the vocabulary daily, including *blog* for we*blog*, *jpeg* for *j*oint *p*hotographics *e*xpert *g*roup, GUI, pronounced 'gooey', for *g*raphical *u*ser *i*nterface, PDA for *p*ersonal *d*igital *a*ssistant and MP3 for MPEG audio layer 3, where MPEG itself is the acronym for *m*oving *p*icture *e*xperts *g*roup, and let us not forget OMG (Oh my God).

alphabet abbreviations
Acronyms produced by sounding out each letter, as in AFL for Australian Football League.

Unbelievable though it may seem, acronyms in use somewhere in the English-speaking world number into the tens of thousands if not hundreds of thousands, a dramatic nod to the creativity and changeability of human language.

Borrowings or loan words

> Neither a borrower nor a lender be.

Languages pay little attention to Polonius' admonition quoted above, and many of them are avid borrowers and lenders. Borrowing words from other languages is an important source of new words. **Borrowing** occurs when one language adds a word or morpheme from another language to its own lexicon. This often happens in situations of language contact, when speakers of different languages regularly interact with one another, and especially where there are many bilingual or multilingual speakers.

borrowing
The incorporating of a loan word from one language into another.

The pronunciation of **loan words** is often (but not always) altered to fit the phonological rules of the borrowing language. For example, English borrowed *ensemble* [ãsãbəl] from French but pronounce it [ɔ̃nsɔ̃mbəɫ] with [n] and [m] inserted, because English does not ordinarily have

loan word
A word in one language whose origins are in another language.

syllables centred on nasal vowels alone. Other borrowed words, such as the Scottish word for 'lake', *loch*, will often be pronounced as the original Gaelic [lɔx] with a final velar fricative, even though such a pronunciation does not conform to the rules of English.

Larger units than words may be borrowed. French provides us with *ménage à trois* [mẽnaʒ a tʀa], 'three-way romance', where [ʀ] is a uvular trill, which is pronounced in the French way by those who know French, but is also anglicised in various ways, such as [mẽnɐːʤ ɐː twɐː].

loan translation
A compound word or expression whose parts are translated literally into the borrowing language.

etymology
The history of words; the study of the history of words.

When an expression is borrowed and then translated into the borrowing language, such as *world view* from German *Weltanschauung*, it is called a **loan translation**. *It goes without saying* from French *il va sans dire* is a loan translation from French. On the other hand, Spanish speakers eat *perros calientes*, a loan translation of *hot dogs* with an adjustment reversing the order of the adjective and noun, as required by the rules of Spanish syntax.

The lexicons of most languages can be divided into native words and loan words. A native word is one whose history or **etymology** can be traced back to the earliest known stages of the language.

A language may borrow a word directly or indirectly. A direct borrowing means that the borrowed item is a native word in the language from which it is borrowed. *Feast* was borrowed directly from French and can be traced back to Latin *festum*. On the other hand, the word *algebra* was borrowed from Spanish, which in turn had borrowed it from Arabic. Therefore, *algebra* was indirectly borrowed from Arabic, with Spanish as an intermediary. Some languages are heavy borrowers. Albanian has borrowed so heavily that few native words are retained. On the other hand, most Native American languages borrowed little from their neighbours.

English has borrowed extensively. Of the 20 000 or so words in common use, about three-fifths are borrowed. On the other hand, of the 500 most frequently used words only two-sevenths are borrowed, and because these words are used repeatedly in sentences (they are mostly closed class words) the actual frequency of appearance of native words is about 80 per cent. The frequently used words *and*, *be*, *have*, *it*, *of*, *the*, *to*, *will*, *you*, *on*, *that* and *is* are all native to English.

Language may borrow not only words and phrases but other linguistic units as well. We saw earlier how English in effect borrowed the phonemes /v/ and /ʒ/ from French. The bound morpheme suffixes *-ible*/*-able* were also borrowed from French, arriving in English by hitchhiking on French words, such as *incredible*, but soon attaching themselves to native words, such as *drinkable*.

History through loan words

> A morsel of genuine history is a thing so rare as to be always valuable.
>
> Thomas Jefferson, in a letter to John Adams, 1817

We may trace the history of the English-speaking peoples by studying the kinds of loan words in their language, their source and when they were borrowed.

Until the Norman Conquest in 1066, the Angles, the Saxons and the Jutes inhabited England. They were of Germanic origin when they came to Britain in the fifth century to eventually become the English. Originally, they spoke Germanic dialects, from which Old English developed directly. These dialects contained some Latin borrowings but few foreign elements beyond that. These Germanic tribes had displaced the earlier Celtic inhabitants, whose influence on Old English was confined to a few Celtic placenames (the modern languages Welsh, Irish and Scots Gaelic are descended from the Celtic dialects).

The conquering Normans spoke French, and for three centuries after the Conquest, French was used for all affairs of state and for most commercial, social and cultural matters. The West Saxon literary language was abandoned, but regional varieties of English continued to be used in homes, churches and the marketplace. During these three centuries, vast numbers of French words entered English, of which the following are representative:

government	crown	prince	estate	parliament
nation	jury	judge	crime	sue
attorney	saint	miracle	charity	court
lechery	virgin	value	pray	mercy
religion	chapel	royal	money	society

Until the Normans came, when an Englishman slaughtered an ox for food, he ate *ox*. If it was a pig, he ate *pig*. If it was a sheep, he ate *sheep*. However, 'ox' served at the Norman tables was *beef* (*boeuf*), 'pig' was *pork* (*porc*) and 'sheep' was *mutton* (*mouton*). These words were borrowed from French into English, as were the food-preparation words *boil*, *fry*, *stew* and *roast*. Over the years French foods have given English a flood of borrowed words for menu preparers:

aspic	bisque	bouillon	brie	brioche
canapé	caviar	consommé	coq au vin	coupe
crêpe	croissant	croquette	crouton	escargot
fondue	mousse	pâté	quiche	ragout

English borrowed many words from foreign sources during the Renaissance. In 1475, William Caxton introduced the printing press in England. By 1640, 55 000 books had been printed in English. The authors of these books used many Greek and Latin words and as a result, many words of ancient Greek and Latin entered the language. From Greek came *drama*, *comedy*, *tragedy*, *scene*, *botany*, *physics*, *zoology* and *atomic*. Latin loan words in English are numerous. They include:

bonus	scientific	exit	alumnus	quorum	describe

During the ninth and tenth centuries, Scandinavian raiders, who eventually settled in the British Isles, left their traces in the English language. The pronouns *they*, *their* and *them* are loan words from Old Norse, the predecessor of modern Danish, Norwegian and Swedish. This period is the only time that English ever borrowed pronouns. *Bin*, *flannel*, *clan*, *slogan* and *whisky* are all words of Celtic origin, borrowed at various times from Welsh, Scots Gaelic or Irish. Dutch was a source of borrowed words, too, many of which are related to shipping: *buoy*, *freight*, *leak*, *pump*, *yacht*. From German came *quartz*, *cobalt* and – as we might guess – *sauerkraut*. From Italian, many musical terms, including words describing opera houses, have been borrowed: *opera*, *piano*, *virtuoso*, *balcony* and *mezzanine*. Italian also gave us *influenza*, which was derived from the Italian word for 'influence' because the Italians were convinced that the disease was *influenced* by the stars.

Many scientific words were borrowed indirectly from Arabic because early Arab scholarship in these fields was quite advanced. *Alcohol*, *algebra*, *cipher* and *zero* are a small sample. Spanish has loaned us (directly) *barbecue*, *cockroach* and *ranch*, as well as *California*, literally, 'hot furnace'. In America, the English-speaking colonists borrowed from Native American languages. They provided us with *hickory*, *chipmunk*, *opossum* and *squash*, to mention only a few. Nearly half the names of US states are borrowed from one Native American language or another. Likewise, Australian English has borrowed from Aboriginal languages, including words such as *billabong*, *currawong*, *dingo*, and *waratah*, among many others.

English has borrowed from Yiddish. Many non-Jews as well as non-Yiddish-speaking Jews use Yiddish words. There was once even a bumper sticker proclaiming: 'Marcel Proust is a yenta'. *Yenta* is a Yiddish word meaning 'gossipy woman' or 'shrew'. *Lox*, 'smoked salmon', and *bagel*, 'a doughnut dipped in cement', now belong to English, as do Yiddish expressions such as *chutzpah*, *schmaltz*, *schlemiel*, *schmuck*, *schmo* and *kibitz*.

English is also a lender of copious numbers of words to other languages, especially in the areas of technology, sports and entertainment. Words and expressions such as *jazz*, *whisky*, *blue jeans*, *rock music*, *supermarket*, *baseball*, *picnic* and *computer* have been borrowed into languages as diverse as Twi, Hungarian, Russian and Japanese.

Loss of words

> Pease porridge hot
> Pease porridge cold
> Pease porridge in the pot nine days old
>
> Nursery rhyme

Languages may be said to lose words in the sense that the frequency of usage falls below a certain threshold. Such words may still be counted when tallying up the size of the lexicon, but they are lost to the general population. But although languages can lose words, the departure of an old word is never as striking as the arrival of a new one. When a new word comes into vogue, its unusual presence draws attention, but a word is lost through inattention – nobody thinks of it, nobody uses it, and its usage fades away.

A reading of Shakespeare's works shows that English has lost many words, such as these taken from *Romeo and Juliet*: *beseem*, 'to be suitable', *mammet*, 'a doll or puppet', *wot*, 'to know', *gyve*, 'a fetter', *fain*, 'gladly', and *wherefore*, 'why', as in Juliet's plaintive cry: 'O Romeo, Romeo! wherefore art thou Romeo?', in which she is questioning why he is so named, not his current location.

More recently, there are expressions used by your grandparents that have already been lost. For example, *quid*, meaning 'a pound note', is no longer used. And even words used by your parents (and us) sound dated, for example, *groovy* ('excellent') and *grass* and *pot*, now called *weed*, referring to marijuana. The word *stile*, meaning 'steps crossing a fence or gate', is no longer widely understood. Other similar words for describing rural objects are fading out of the language as a result of urbanisation. Note also that *pease*, from which *pea* is a back-formation, is gone.

Technological change may also be the cause for the loss of words. *Acutiator* once meant 'sharpener of weapons' and *tormentum* once meant 'siege engine'. Advances in warfare have put these terms out of business but given us *cruise missile* and an extension of the word *drone*, a pilotless aircraft. *Whiteboard* is in and *blackboard* is out insofar as classroom teaching is concerned. Although one still finds the words *buckboard*, *buggy*, *dogcart*, *hansom*, *surrey* and *tumbrel* in the dictionary – all of them referring to different kinds of horse-drawn carriages – progress in transportation is likely to render these terms obsolete and eventually they will be lost.

Semantic change

> The language of this country being always upon the flux, the Struldbruggs of one age do not understand those of another, neither are they able after two hundred years to hold any conversation (farther than by a few general words) with their neighbours the mortals, and thus they lie under the disadvantage of living like foreigners in their own country.
>
> Jonathan Swift, *Gulliver's Travels*, 1726

We have seen that a language may gain or lose lexical items. Additionally, the meaning or semantic representation of words may change by becoming broader or narrower, or by shifting.

Broadening

When the meaning of a word becomes broader, that word means everything it used to mean and more. The Middle English word *dogge* meant a specific breed of dog, but it was eventually **broadened** to encompass all members of the species *Canis familiaris*. The word *holiday*, from 'holy day', originally meant a day of religious significance. Today the word signifies any day on which we do not have to work. *Picture* used to mean 'painted representation', but today you can take a picture with a camera, not to mention a mobile phone. *Manage* once meant simply to handle a horse. *Quarantine* once had the meaning of 'forty days' isolation', but at the present pandemic of COVID-19 it refers to any given period of isolation.

More recent broadenings, spurred by the computer age, are *computer*, *mouse*, *cookie*, *cache*, *virus* and *bundle*. *Footage* used to refer to a certain length of film or videotape, but nowadays it means any excerpt from electronic video media, such as DVDs, irrespective of whether its length can be measured in feet. Google was broadened first from the name of a company to a verb meaning 'to use that company's search engine on the internet', and from there further broadened to simply 'search the internet'. *Twitter* and *tweet* were once words confined to the aviary – need we say more.

broadening
A semantic change in which the meaning of a word changes over time to become more encompassing, e.g. *dog* once meant 'a particular breed of dog'.

Narrowing

In the King James version of the Bible (1611 CE), God says of the herbs and trees, 'to you they shall be for meat' (Genesis 1:29). To a speaker of seventeenth-century English, *meat* meant 'food' and *flesh* meant 'meat'. Since that time, semantic change has **narrowed** the meaning of *meat* to what it is in Modern English. The word *deer* once meant 'beast' or 'animal', as its German cognate *Tier* still does. The meaning of *deer* has been narrowed to a particular kind of animal. Similarly, the word *hound* used to be the general term for 'dog', like the German *Hund*. Today *hound* means a special kind of dog, one used for hunting. *Skyline* once meant 'horizon' but has been narrowed to mean 'the outline of a city at the horizon'.

narrowing
A semantic change in which the meaning of a word changes in time to become less encompassing.

Meaning shifts

The third kind of semantic change that a lexical item may undergo is a shift in meaning. The word *knight* once meant 'youth' but shifted to 'mounted man-at-arms'. *Lust* used to mean simply 'pleasure', with no negative or sexual overtones. *Lewd* was merely 'ignorant' and *immoral* meant 'not customary'. *Silly* used to mean 'happy' in Old English, but by the Middle English period it had come to mean 'naive' and only in Modern English does it mean 'foolish'. The overworked Modern English word *nice* meant 'ignorant' a thousand years ago. When Juliet tells Romeo, 'I am too *fond*', she is not claiming she likes Romeo too much. She means 'I am too *foolish*'. And if a drone has you in its sights, look forward to something rather worse than a bee sting.

Reconstructing dead languages

> The living languages, as they were called by the Harvard fellows, were little more than cheap imitations, low distortions. Italian, like Spanish and German, particularly represented the loose political passions, bodily appetites, and absent morals of decadent Europe.
>
> Matthew Pearl, *The Dante Club*, 2003

> None of your living languages for Miss Blimber. They must be dead – stone dead – and then Miss Blimber dug them up like a Ghoul.
>
> Charles Dickens, *Dombey and Son*, 1848

Despite the disdain for the modern languages expressed in Matthew Pearl's book and by Miss Blimber, it is through the comparative study of the living languages that linguists are able to learn about older languages that left no written record and the changes that occurred over time.

The nineteenth-century comparativists

> When agreement is found in words in two languages, and so frequently that rules may be drawn up for the shift in letters from one to the other, then there is a fundamental relationship between the two languages.
>
> Rasmus Rask, Danish linguist (1787–1832)

The chief goal of the nineteenth-century historical and comparative linguists was to develop and elucidate the genetic relationships that exist among the world's languages. They aimed to establish the major language families of the world and to define principles for the classification of languages. They based their theories on observations of regular sound correspondences among certain languages. They proposed that languages displaying systematic similarities and differences must have descended from a common source language – that is, they must be genetically related. Their work grew out of earlier research.

As a child, Sir William Jones had an astounding propensity for learning languages, including so-called dead ones such as Ancient Greek and Latin. While residing in India, he added Sanskrit to his studies and observed that Sanskrit bore to Greek and Latin 'a stronger affinity … than could possibly have been produced by accident'. Jones suggested that these three languages had 'sprung from a common source' and that probably Germanic and Celtic had the same origin.

Following up on Jones' research, the German linguist Franz Bopp pointed out the relationships among Sanskrit, Latin, Greek, Persian and Germanic. At the same time, a young Danish scholar, Rasmus Rask, corroborated these results and brought Lithuanian and Armenian into the relationship as well. Rask was the first scholar to describe formally the regularity of certain phonological differences of related languages.

Rask's investigation of these regularities inspired German linguist Jakob Grimm (of fairy-tale fame), who published a four-volume treatise (1819–1822) that specified the regular sound correspondences among Sanskrit, Greek, Latin and the Germanic languages. Not only did the similarities intrigue Grimm and the other linguists, but so did the systematic nature of the differences. Where Latin has a [p], English often has an [f]; where Latin has a [t], English often has a [θ]; where Latin has a [k], English often has an [h].

Grimm posited a far earlier language (which we now refer to as Indo-European) from which all these languages evolved. He explained the sound correspondences by means of rules of phonological change (which historical linguists called sound shift, or sound change). Grimm's major discovery was that certain rules of sound change that applied to the Germanic family of languages, including the ancestors of English, did not apply to Sanskrit, Greek and Latin. This accounted very nicely for many of the regular differences between the Germanic languages and the others. Because the changes were so strikingly regular, they became known as **Grimm's Law**, which is illustrated in **Figure 10.2**.

Grimm's Law
The description of a phonological change in the sound system of an early ancestor of the Germanic languages, formulated by Jakob Grimm.

Figure 10.2 **Grimm's Law, an early Germanic sound shift**

Earlier stage*	bh	dh	gh	b	d	g	p	t	k
	↓	↓	↓	↓	↓	↓	↓	↓	↓
Later stage	b	d	g	p	t	k	f	θ	x (or h)

*This earlier stage is Indo-European. The symbols *bh*, *dh* and *gh* are breathy voiced stop consonants. These phonemes are often called 'voiced aspirates'.

Grimm's Law can be expressed in terms of natural classes of speech sounds: voiced aspirates become unaspirated, voiced stops become voiceless, voiceless stops become fricatives.

Cognates

Cognates are words in related languages that developed from the same ancestral root, such as English *horn* and Latin *cornu*. Cognates often, but not always, have the same meaning in the different languages. From cognates we can observe sound correspondences and from them deduce sound changes. In **Table 10.3** the regular correspondence *p–p–f* of cognates from Sanskrit, Latin and Germanic (represented by English) indicates that the languages are genetically related. Indo-European **p* is posited as the origin of the *p–p–f* correspondence.[2]

cognates
Words in related languages that developed from the same ancestral **root**.

Table 10.3 Cognates of Indo-European *p

Indo-European	Sanskrit	Latin	English
**p*	*p*	*p*	*f*
	pitar	pater	father
	pad-	ped	foot
	No cognate	piscis	fish
	paśu*	pecu	fee

**ś* is a sibilant pronounced differently than *s* was pronounced.

Table 10.4 is a more detailed chart of correspondences, in which a single representative example of each regular correspondence is presented. In most cases, cognate sets exhibit the same correspondence, which leads to the reconstruction of the Indo-European sound shown in the first column.

Table 10.4 Some Indo-European sound correspondences

Indo-European	Sanskrit		Latin		English	
**p*	p	pitar	p	pater	f	father
**t*	t	trayas	t	trēs	θ	three
**k*	ś	śun	k	canis	h	hound
**b*	b	No cognate	b	labium	p	lip
**d*	d	dva	d	duo	t	two
**g*	j	ajras	g	ager	k	acre
**bh*	bh	bhrātar	f	frāter	b	brother
**dh*	dh	dhā	f	fē-ci	d	do
**gh*	h	vah-	h	veh-ō	g	wagon

Sanskrit underwent the fewest consonant changes (i.e. has more sounds in common with Indo-European), Latin somewhat more and Germanic (under Grimm's Law) underwent almost a complete restructuring. The changes we observe are changes to the phonemes and phonological rules, and all words with those phonemes will reflect those changes (but see the caveat in the following paragraph).

If we imagine that the changes happened independently to individual words, rather than individual sounds, we could not explain why so many words beginning with /p/ in Sanskrit and Latin just happen to begin with /f/ in Germanic and so on. It would far exceed the possibilities of coincidence. It is the fact that the changes are in the phonology of the languages that has resulted in the remarkably regular, pervasive correspondences that allow us to reconstruct much of the Indo-European sound system.

Grimm noted that there were exceptions to the regular correspondences he observed. He stated: 'The sound shift is a general tendency; it is not followed in every case'. Several decades later, in 1875, Karl Verner explained some of the exceptions to Grimm's Law. He formulated **Verner's Law** to show why, in certain cases, Indo-European *p*, *t* and *k* failed to correspond to *f*, θ and *x*:

Verner's Law
The description of a conditioned phonological change in the sound system of certain **Indo-European** languages wherein **voiceless** fricatives were changed when the preceding vowel was unstressed; formulated by Karl Verner as an explanation for some of the exceptions to **Grimm's Law**.

> **Verner's Law: When the preceding vowel was unstressed, *f*, θ and *x* underwent a further change to *b*, *d* and *g*.**

Encouraged by the regularity of sound change, a group of young nineteenth-century linguists proposed the **Neo-grammarian** hypothesis, which says that sound shifts are not merely tendencies (as Grimm claimed) but apply in all words that meet their environment. If exceptions were nevertheless observed, it was trusted that further laws would be discovered to explain them, just as Verner's Law explained the exceptions to Grimm's Law. The Neo-grammarians viewed linguistics as a natural science and therefore believed that laws of sound change were exceptionless. The 'laws' they put forth often had exceptions, however, which could not always be explained as dramatically as Verner's Law explained the exceptions to Grimm's Law. Still, the work of these linguists provides important data and insights into language change and why such changes occur.

Neo-grammarians
A group of nineteenth-century linguists who claimed that sound shifts (i.e. changes in phonological systems) are not merely tendencies but apply in all words that meet their environment.

The linguistic work of the early nineteenth century had some influence on Charles Darwin and, in turn, Darwin's theory of evolution had a profound influence on linguistics and on all science. Some linguists thought that languages had a 'life cycle' and developed according to evolutionary laws. In addition, it was believed that every language could be traced to a common ancestor. This theory of biological naturalism has an element of truth to it, but it is an oversimplification of how languages change and evolve into other languages.

Comparative reconstruction

> … Philologists who chase
> A panting syllable through time and space
> Start it at home, and hunt it in the dark
> To Gaul, to Greece, and into Noah's Ark.
>
> William Cowper, 'Retirement', 1782

When languages resemble one another in ways not attributable to chance or borrowing or to general principles of Universal Grammar, we may conclude they are descended from a common source. That is, they evolved via linguistic change from an ancestral protolanguage.

comparative reconstruction
The deducing of forms in the ancestral language of genetically related descendent languages by application of the **comparative method**.

The similarity of the basic vocabulary of languages such as English, German, Danish, Dutch, Norwegian and Swedish is too pervasive for chance or borrowing. We therefore conclude that these languages have a common parent, Proto-Germanic. There are no written records of Proto-Germanic and certainly no native speakers alive today. Proto-Germanic is a partially reconstructed language whose properties have been deduced based on its descendants. In addition to related vocabulary, the Germanic languages share grammatical properties such as similar sets of irregular verbs, particularly the verb *to be*, further supporting their relatedness.

comparative method
The technique linguists use to deduce forms in an ancestral language by examining corresponding forms in several of its descendent languages.

Once we know or suspect that several languages are related, their protolanguage may be partially determined by **comparative reconstruction**. One proceeds by applying the **comparative method**, which we illustrate with the following brief example.

Restricting ourselves to English, German and Swedish, we find the word for 'man' is *man* [mæn], *Mann* [man] and *man* [man] respectively. This is one of many word sets in which we can observe the regular sound correspondence [m]–[m]–[m] and [n]–[n]–[n] in the three languages.

Based on this evidence, the comparative method has us reconstruct **mVn* as the word for 'man' in Proto-Germanic. The *V* indicates a vowel whose quality we are unsure of because, despite the similar spelling, the vowel is phonetically different in the various Germanic languages and it is unclear how to reconstruct it without further evidence.

Although we are confident that we can reconstruct much of Proto-Germanic with relative accuracy, we can never be sure, and many details remain obscure. To build confidence in the comparative method, we can apply it to Romance languages such as French, Italian, Spanish and Portuguese. Their protolanguage is the well-known Latin, so we can verify the method. Consider the following data, which focus on the initial consonant of each word. In these data, *ch* in French is [ʃ] and *c* in the other languages is [k]:

French	Italian	Spanish	Portuguese	
cher	**c**aro	**c**aro	**c**aro	'dear'
champ	**c**ampo	**c**ampo	**c**ampo	'field'
chandelle	**c**andela	**c**andela	**c**andeia	'candle'

The French [ʃ] corresponds to [k] in the three other languages. This regular sound correspondence, [ʃ]–[k]–[k]–[k], supports the view that French, Italian, Spanish and Portuguese descended from a common language. The comparative method leads to the reconstruction of [k] in *dear*, *field* and *candle* of the parent language, and shows that [k] underwent a change to [ʃ] in French, but not in Italian, Spanish or Portuguese, which retained the original [k] of the parent language, Latin.

To use the comparative method, analysts identify regular sound correspondences in the cognates of potentially related languages. For each correspondence, they deduce the most likely sound in the parent language. In this way, much of the sound system of the parent may be reconstructed. The various phonological changes in the development of each daughter language as it descended and changed from the parent are then identified. Sometimes the sound that analysts choose in their reconstruction of the parent language is the one that appears most frequently in the correspondence. This is the 'majority rule' principle, which we illustrated with the four Romance languages.

Other considerations may outweigh the majority rule principle. The likelihood of certain phonological changes may persuade the analyst to reconstruct a less frequently occurring sound, or even a sound that does not occur in the correspondence.

Worked example

Consider the data in these four hypothetical languages:

Language A	Language B	Language C	Language D
hono	hono	fono	vono
hari	hari	fari	veli
rahima	rahima	rafima	levima
hor	hor	for	vol

Wherever languages A and B have an *h*, language C has an *f* and language D has a *v*. Therefore, we have the sound correspondence *h*–*h*–*f*–*v*. Using the majority rule principle, we might first consider reconstructing the sound *h* in the parent language, but from other data on historical change and from phonetic research, we know that *h* seldom becomes *v*. The reverse, /f/ and /v/ becoming [h], occurs historically and as a phonological rule and has an acoustic explanation. Therefore, linguists reconstruct an **f* in the parent and posit the sound changes '*f* becomes *h*' in languages A and B, and '*f* becomes *v*' in language D. This is the 'naturalness principle' and one obviously needs experience and knowledge to apply it.

The other correspondences are not problematic as far as these data are concerned:

o–o–o–o	n–n–n–n	a–a–a–e	r–r–r–l	m–m–m–m

They lead to the reconstructed forms **o*, **n*, **a*, **r* and **m* for the parent language, and the sound changes '*a* becomes *e*' and '*r* becomes *l*' in language D. These are natural sound changes found in many of the world's languages.

It is now possible to reconstruct the words of the protolanguage. They are **fono*, **fari*, **rafima* and **for*. Language D, in this example, is the most innovative of the four languages, because it has undergone three sound changes. Language C is the most conservative, in that it is identical to the protolanguage insofar as these data are concerned.

unconditioned sound change
Historical phonological change that occurs in all phonetic contexts, e.g. the **Great Vowel Shift** of English, in which long vowels were modified wherever they occurred in a word.

conditioned sound change
Historical phonological change that occurs in specific phonetic contexts, e.g. the voicing of /f/ to [v] when it occurs between vowels.

The sound changes we have seen in the previous illustrations are examples of **unconditioned sound change**, that is, the changes occurred irrespective of phonetic context. What follows is an example of **conditioned sound change**, taken from three dialects of Italian:

Worked example

Standard	Northern	Lombard	
fis:o	fiso	fis	'fixed'
kas:a	kasa	kasə	'cabinet'

The correspondence sets are:

f–f–f	i–i–i	s:–s–s	o–o–<> [3]	k–k–k	a–a–a	a–a–ə

It is straightforward to reconstruct **f*, **i* and **k*. Knowing that a long consonant such as s: commonly becomes *s*, we reconstruct *s: for the s:–s–s correspondence. A shortening change took place in the Northern and Lombard dialects.

There is evidence in these (very limited) data for a weakening of word-final vowels, again a change we discussed earlier for English. We reconstruct **o* for o–o–<> and **a* for a–a–ə. In Lombard, conditioned sound changes took place. The sound *o* was deleted in word-final position but remained *o* elsewhere. The sound *a* became ə in word-final position and remained *a* elsewhere. As far as we can tell from the data presented, the conditioning factor is word-final position. Vowels in other positions do not undergo change. We reconstruct the parent dialect as having had the words *fis:o meaning 'fixed', and *kas:a meaning 'cabinet'.

Worked example

As our last example consider these data from an earlier and later form of a Slavic language. The question is, which came first? (When the comparative method is applied to earlier and later forms of a language the process is called internal reconstruction.)

L1	L2	
lovuka	lofkə	'clever'
gladuka	glatkə	'smooth'
ʒeʒika	ʒeʃkə	'burning hot'
kratuka	kratkə	'short'
blizuka	bliskə	'near'

The sound correspondences reading down through the data are: *l–l, o–o, v–f, u–*<>, *k–k, a–ə, g–g, a–a, d–t, ʒ–ʒ, e–e, ʒ–ʃ, i–*<>, *r–r, t–t, b–b, i–i, z–s*. These we reorganise into *non-problematic*, where no change took place between older and newer forms, and *problematic*, where some kind of changes must have occurred:

Non-problematic*: *l–l, o–o, k–k, g–g, e–e, r–r, b–b

Problematic*: *v–f, u–*<>*, a–ə, a–a, d–t, ʒ–ʒ, ʒ–ʃ, i–*<>*, t–t, i–i, z–s

To further understand the problematic correspondences we further reorganise by grouping vowels and consonants:

***Vowel correspondences*: *a–a, a–ə; i–i, i–*<>*; u–*<>**

Consonant correspondences*: *d–t, t–t; v–f; ʒ–ʒ, ʒ–ʃ; z–s

We now see that as far as vowels are concerned, L1 is an earlier form because there is evidence of a vowel-weakening change, with vowels either deleted or reduced to schwa. The opposite change, of vowel insertion or strengthening, is unlikely. This is clearly a conditioned change because it does not occur in all phonetic contexts. There appear to be two such changes:

Change A: *a* becomes schwa in word-final position.

Change B: *i* and *u* are deleted in penultimate syllables.

This is the best we can do with the data at hand. Further research may reveal that change A applies to all vowels in word-final position, and that change B applies to high vowels only, or perhaps to all vowels. We cannot say anything more about the vowel *o*, either, given this restricted data. The matter is under-determined.

As for consonants, there is a change in voicing and while changes go both ways historically, from voiced to unvoiced or vice versa, once persuaded by the vowel changes that L1 is earlier, a devoicing rule is seen as plausible. The *d–d* and *d–t* correspondences suggest a conditioned change, and a closer look at the data suggests a voicing assimilation rule.

Change C: Obstruents are devoiced when followed by a voiceless obstruent.

This is a commonly observed change and it supports the hypothesis that L1 is the earlier form.

There is one catch, however. In order for change C to take place, change B must have taken place first to bring the obstruents together. This, then, is an instance of historical rule ordering, not unlike the ordering of phonological rules that we observed in Chapter 3.

It is by means of the comparative method that nineteenth-century linguists were able to initiate the reconstruction of Indo-European, the long-lost ancestral language so aptly conceived by Jones, Bopp, Rask and Grimm, a language that flourished about 6000 years ago.

Historical evidence

> You know my method. It is founded upon the observance of trifles.
>
> Sir Arthur Conan Doyle, 'The Boscombe Valley Mystery',
> *The Memoirs of Sherlock Holmes*, 1891

The comparative method is not the only way to explore a language or language family's past. Moreover, the comparative method may prove unable to answer certain questions because data are lacking or reconstructions are untenable. How, for example, do we know positively how Shakespeare or Chaucer or the anonymous author of *Beowulf* pronounced their versions of English? The comparative method leaves many details in doubt and we have no recordings that give us direct knowledge.

Various documents from the past can be examined for evidence. Private letters are an excellent source of data. Linguists prefer letters written by naive spellers, who will misspell words according to the way they pronounce them. For instance, at one point in English history, all words spelt with *er* in their stems were pronounced as if they were spelt with *ar*, just as in modern British English *clerk* and *derby* are pronounced 'clark' and 'darby'. Some poor speller kept writing 'parfet' for *perfect*, which helped linguists discover the older pronunciation.

Clues are also provided by the writings of the prescriptive grammarians of the period. Between 1550 and 1750, a group of prescriptivists in England known as orthoepists attempted to preserve the purity of English. In prescribing how people should speak, they told us how people actually spoke. An orthoepist alive in the US today might write in a manual: 'It is incorrect to pronounce *Cuba* with a final *r*'. Future scholars would know that some speakers of English pronounced it that way.

Some of the best clues to earlier pronunciation are provided by puns and rhymes in literature. Two words rhyme if the vowels and final consonants are the same. When a poet rhymes the verb *found* with the noun *wound*, it strongly suggests that the vowels of these two words were identical:

***Benvolio*: 'tis in vain to seek him here that means not to be found.**

***Romeo*: He jests at scars that never felt a wound.**

Shakespeare's rhymes are helpful in reconstructing the sound system of Elizabethan English. The rhyming of *convert* with *depart* in Sonnet XI strengthens the conclusion that *er* was pronounced as 'ar'.

For many languages, written records go back more than a thousand years. With the invention of the printing press in the fifteenth century, written matter became increasingly prolific. Today an effort is underway to digitise everything ever printed so as to make it computer analysable. As this is being accomplished, it enables linguists to study these records to find out how languages were once pronounced. The spelling in early manuscripts tells us a great deal about the sound systems of older forms of modern languages. Two words spelt differently were probably pronounced differently. Once several orthographic contrasts are identified, good guesses can be made as to actual pronunciation. For example, because we spell Mary, merry, and marry differently, we may conclude that at one time most speakers pronounced them differently, probably [meɹi], [mɛɹi], and [mæɹi]. For at least one modern American dialect, only /ɛ/ can occur before /ɹ/, so the three words are all pronounced [mɛɹi]. That is the result of a sound shift in which both /e/ and /æ/ shifted to /ɛ/ when followed immediately by /ɹ/. This is another instance of a conditioned sound change.

Computer analysis of vast amounts of printed data may not only reveal subtle changes that have taken place historically – for example, the change in usage of irregular past tense forms (*swept* versus *sweeped*) – but also the rate of change as well. Taking the observed rate of change as a measuring rod, historical linguists may be able to determine the span of time between earlier forms and their later counterparts.

The historical comparativists working on languages with written records have a challenging job, but not nearly as challenging as that of scholars who are attempting to discover genetic relationships among languages with no written history. Linguists must first transcribe large amounts of language data from all the languages; analyse them phonologically, morphologically and syntactically; and establish a basis for relatedness, such as similarities in basic vocabulary and regular sound correspondences not resulting from chance or borrowing. Only then can the comparative method be applied to reconstruct the extinct protolanguage.

Proceeding in this manner, linguists have discovered many relationships among Native American languages and have successfully reconstructed Amerindian protolanguages. Similar achievements have been made with the indigenous languages of Australia with the identification of Pama-Nyungan and non-Pama-Nyungan language families. Linguists have been able to group the large number of languages of Africa into four overarching families: Afroasiatic, Nilo-Saharan, Niger-Congo and Khoisan. Somali, for example, is in the Afroasiatic family, Zulu is in the Niger-Congo family and Hottentot, spoken in South Africa, is in the Khoisan family. These familial divisions are subject to revision if new discoveries or analyses deem it necessary.

Extinct and endangered languages

> Any language is the supreme achievement of a uniquely human collective genius, as divine and unfathomable a mystery as a living organism.
>
> Michael Krauss, in a speech to the Linguistic Society of America, 1991

> I am always sorry when any language is lost, because languages are the pedigree of nations.
>
> Samuel Johnson (1709–1784)

A language dies and becomes extinct when no children learn it. Linguists have identified several ways in which a language might cease to exist, leastwise in its spoken form.

A language may die out more or less suddenly (**sudden language death**) when all the speakers of the language themselves die or are killed. Such was the case with Tasmanian languages, once spoken by Aboriginals on the island of Tasmania, and Nicoleño, a Native American language once spoken in California.

sudden language death
Disappearance of a language when all speakers of the language die or are killed in a short time period.

Similarly, a language may cease to exist relatively abruptly when its speakers stop speaking the language for the duration of their lifetimes (**radical language death**). Often, the reason for this abrupt change is survival under the threat of political repression or genocide. Indigenous languages embedded in other cultures may suffer death this way. In order to avoid being identified as 'natives', speakers simply stop speaking their native language. Children are unable to learn a language that is not spoken in their environment and when the last speaker dies, the language dies.

radical language death
Disappearance of a language when all speakers of the language cease to speak the language.

Most commonly, languages that become extinct do so gradually over several generations. This happens to minority languages that are in contact with a dominant language, much as Australian Indigenous languages and Native American languages are in contact with English. In each generation, fewer and fewer children learn the language until there are no new learners. The language is said to be dead when the last generation of speakers dies out. Cornish suffered this fate in Britain in the eighteenth century, as have many Aboriginal languages in Australia and Native American languages in North and South America.

While not common, some languages suffer 'partial death' in that they survive only in specific contexts, such as a liturgical language. Latin and, at one time, Hebrew are such languages. It contrasts with **gradual language death**, which in its dying throes is spoken casually and informally in homes and villages. People stopped speaking Latin in daily situations centuries ago, and its usage is confined to scholarly and religious contexts.

gradual language death
Disappearance of a language over a period of several generations, each of which has fewer speakers of the language, until finally no speakers remain.

Many Australian Indigenous languages are experiencing a reduction in the number of native speakers over time. Hundreds have already ceased to be spoken. At the time of European settlement in 1788, there were more than 250 distinct Indigenous languages spoken in Australia. It is estimated that currently more than 90 per cent of Australia's Indigenous languages are endangered.[4]

Doomed languages have existed throughout time. The Indo-European languages Hittite and Tocharian no longer exist. Hittite passed away 3500 years ago and both dialects of Tocharian gave up the ghost around 1000 CE.

Dialects, too, may become extinct. Here is an excerpt from the first paragraph of an AP press release, 10 April 2012:

> LONDON – In a remote fishing town on the tip of Scotland's Black Isle, the last native speaker of the Cromarty dialect has passed away, taking with him a little fragment of the English linguistic mosaic.

Many English dialects spoken in the US are considered endangered by linguists. For example, the sociolinguist Walt Wolfram is studying the dialect spoken on Ocracoke Island off the coast of North Carolina. One reason for the study is to preserve the dialect, which is in danger of extinction because so many young Ocracokers leave the island and raise their children elsewhere, a case of gradual dialect death. Tourists and retirees are diluting the dialect-speaking population because they are attracted to the island by its unique character, including, ironically, the quaint speech of the islanders.

Linguists have placed many languages on an endangered list. They attempt to preserve these languages by studying and documenting their grammars – the phonetics, phonology and so on – and by recording for posterity the speech of the last few speakers. Through its grammar, each language provides new evidence on the nature of human cognition. In its literature, poetry, ritual speech and word structure, each language stores the collective intellectual achievements of a culture, offering unique perspectives on the human condition. The disappearance of a language is tragic; not only are these insights lost, but the major medium through which a culture maintains and renews itself is gone as well.

Linguists are not alone in their preservation efforts. Under the sponsorship of language clubs and occasionally governments, adults and children learn an endangered language as a symbol of the culture. Gael Linn is a private organisation in Ireland that runs language classes in Irish (Gaelic) for adults. Hundreds of public schools in Ireland and Northern Ireland are conducted entirely in Gaelic. In the US state of Hawaii, a movement is underway to preserve and teach Hawaiian, the native language of the island.

This attempt to slow down or reverse the dying out of a language is also illustrated by the French in Quebec. In 1961 the Quebec Office of the French Language was formed to standardise the dialect of French spoken in Quebec, but ironically refuses to do so for fear of reducing the interintelligibility with other French-speaking communities. It is believed that standardisation would linguistically isolate Québécois and lead to the extinction of French in Canada. Instead, the office uses its powers to promote the use of French, irrespective of dialect.

An astonishing example of the revival of a dormant language occurred in Israel. For centuries, classical Hebrew was used only in religious ceremonies, but today, with some modernisation, it has become the national language of Israel. The Academy of the Hebrew Language in Israel undertook a task that had never been done in the history of humanity – to awaken an ancient written language to serve the daily colloquial needs of the people. Twenty-three lexicologists worked with the Bible and the Talmud to add new words to the language. While there is some attempt to keep the language 'pure', the academy has given way to popular pressure. Thus, a bank cheque is called a *check* [ʧɛk] in the singular and pluralised by adding the Hebrew plural suffix *-im* to form *check-im*, although the Hebrew word *hamcha'ah* was proposed. Similarly, *lipstick* has triumphed over *s'faton* and *pajama* over *chalifat-sheinah* (literally, 'sleeping suit').

The United Nations, too, is concerned about endangered languages. In 1991 the United Nations Educational, Scientific and Cultural Organization (UNESCO) passed a resolution that states:

> As the disappearance of any one language constitutes an irretrievable loss to mankind, it is for UNESCO a task of great urgency to respond to this situation by promoting … the description – in the form of grammars, dictionaries, and texts – of endangered and dying languages.

In 2016, the United Nations General Assembly adopted a resolution proclaiming 2019 as the *International Year of Indigenous Languages* (IYIL2019), 'to draw attention to the critical loss of indigenous languages and the urgent need to preserve, revitalize and promote indigenous languages and to take further urgent steps at the national and international levels', according to the UN Permanent Forum on Indigenous Issues.

The documentation of dying languages is not only important for social and cultural reasons. There is also a scientific reason for studying these languages. Through examining a wide array of different types of languages, linguists can develop a comprehensive theory of language that accounts for both its universal and language-specific properties.

The genetic classification of languages

> The Sanskrit language, whatever be its antiquity, is of a wonderful structure, more perfect than the Greek, more copious than the Latin, and more exquisitely refined than either, yet bearing to both of them a stronger affinity, both in the roots of verbs and in the forms of grammar, than could possibly have been produced by accident; so strong, indeed, that no philologer could examine all three, without believing that they have sprung from some common source, which, perhaps, no longer exists.
>
> Sir William Jones (1746–1794)

We have discussed how different languages evolve from one language and how historical and comparative linguists classify languages into families, such as Germanic or Romance, and reconstruct earlier forms of the ancestral language. When we examine the languages of the world, we perceive similarities and differences among them that provide evidence for degrees of relatedness or non-relatedness.

Counting to five in English, German and Vietnamese shows similarities between English and German not shared by Vietnamese (shown with tones omitted):

English	German	Vietnamese
one	eins	mot
two	zwei	hai
three	drei	ba
four	vier	bon
five	fünf	nam

The similarity between English and German is pervasive. Sometimes it is extremely obvious (*man/Mann*), at other times a little less obvious (*child/Kind*). No regular similarities or differences apart from those resulting from chance are found between them and Vietnamese.

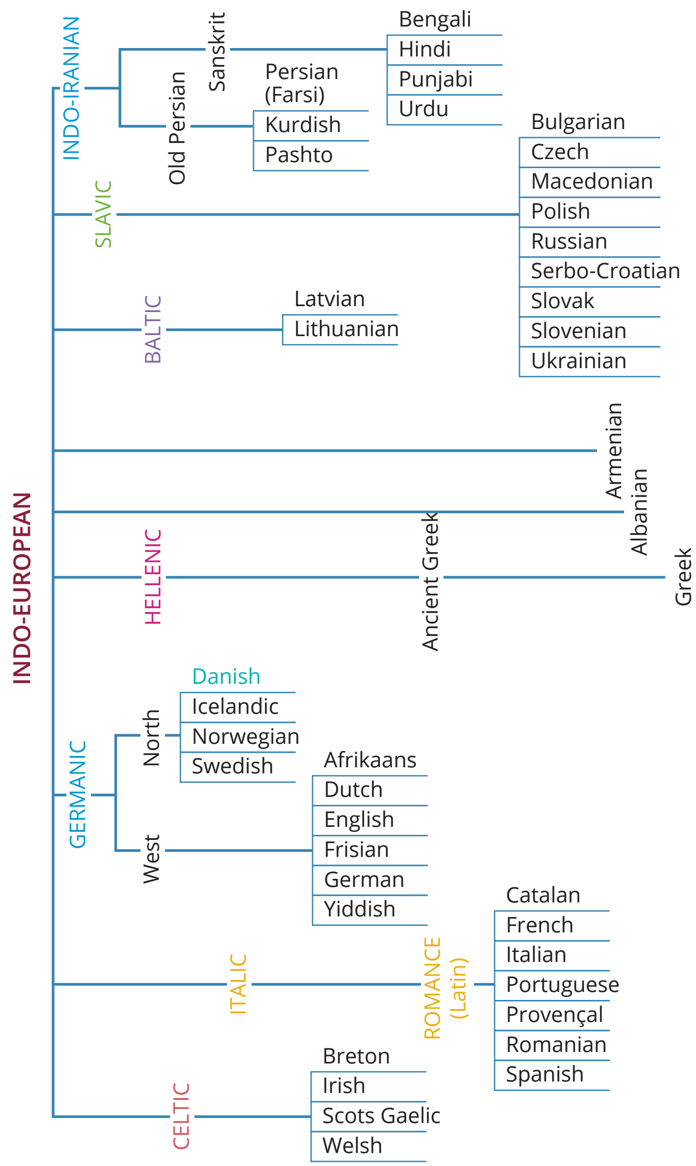
Pursuing the metaphor of human genealogy, we say that English, German, Norwegian, Danish, Swedish, Icelandic and so on are sisters in that they descended from one parent and are more closely related to one another than any of them are to non-Germanic languages such as French or Russian.

The Romance languages are also sister languages, whose parent is Latin. If we carry the family metaphor to an extreme, we might describe the Germanic languages and the Romance languages as cousins, because their respective parents, Proto-Germanic and early forms of Latin, were siblings.

As anyone from a large family knows, there are cousins and then there are distant cousins, encompassing nearly anyone with a claim to family bloodlines. This is true of the Indo-European family of languages. If the Germanic and Romance languages are truly cousins, then languages such as Greek, Armenian, Albanian and even the extinct Hittite and Tocharian are distant cousins. So are Irish, Scots Gaelic, Welsh and Breton, whose protolanguage, Celtic, was once spoken widely throughout Europe and the British Isles. Breton is spoken in Brittany in the northwest coastal regions of France. It was brought there by Celts fleeing from Britain in the seventh century.

Russian is also a distant cousin, as are its sisters, Bulgarian, Serbo-Croatian, Polish, Czech and Slovak. The Baltic language Lithuanian is related to English, as is its sister language, Latvian. A neighbouring language, Estonian, however, is not a relative. Sanskrit, as pointed out by Sir William Jones, although far removed geographically, is nonetheless a relative. Its offspring, Hindi and Bengali, spoken primarily in South Asia, are distantly related to English. Persian (or Farsi), spoken in modern Iran, is a distant cousin of English, as is Kurdish, spoken in Iran, Iraq and Turkey, and Pashto, spoken in Afghanistan and Pakistan. All these languages, except for Estonian, are related, more or less distantly, to one another because they all descended from Indo-European. Figure 10.3 is an abbreviated family tree of the Indo-European languages that gives a genealogical and historical classification of the languages shown. This diagram is somewhat simplified. It appears, for example, that all the Slavic languages are sisters, which suggests the comical scenario of speakers of Proto-Slavic dividing themselves into nine clans one fine morning, with each going their separate way. In fact the nine languages shown can be organised hierarchically, showing some more closely related than others. In other words, the various separations that resulted in the nine Slavic languages we see today occurred several times over a long stretch of time. Similar remarks apply to the other families, including Indo-European.

Figure 10.3 **The Indo-European family of languages**



Another simplification is that the dead ends – languages that evolved and died leaving no offspring – are not included. We have already mentioned Hittite and Tocharian as two such Indo-European languages. The family tree also fails to show several intermediate stages that must have existed in the evolution of modern languages. Languages do not evolve abruptly, which is why comparisons with the genealogical trees of biology have limited usefulness. Finally, because of lack of space, the diagram fails to show some Indo-European languages.

Languages of the world

> And the whole earth was of one language, and of one speech.
>
> Genesis 11:1, King James version (1611 CE)

> Let us go down, and there confound their language, that they may not understand one another's speech.
>
> Genesis 11:7, King James version (1611 CE)

Most of the world's languages do not belong to the Indo-European family. Linguists have also attempted to classify the non-Indo-European languages according to their genetic relationships. The task is to identify the languages that constitute a family and the relationships that exist among them.

The two most common questions asked of linguists are: 'How many languages do you speak?' and 'How many languages are there in the world?' Both questions are difficult to answer precisely. Most linguists have varying degrees of familiarity with several languages and many are **polyglots**, people who speak and understand several languages. Charles V, the Holy Roman Emperor from 1519 to 1558, was a polyglot, for he proclaimed: 'I speak Spanish to God, Italian to women, French to men, and German to my horse'.

polyglot
A person who speaks and understands several languages.

As to the second question, it's difficult to ascertain the precise number of languages in the world because there are no clear criteria to decide what is a language and what is a dialect, as discussed in Chapter 9.

With this caveat in mind, recent estimates place the number of languages in the world today (2020), including sign languages, at a little over 7000, according to the encyclopaedia *Ethnologue: Languages of the World* (see http://www.ethnologue.com/web.asp for more detail). The *Ethnologue* lists 130 sign languages from every continent where languages are spoken, although this number is in dispute and may be very much larger. According to the latest edition of *Ethnologue*, about 40 per cent of the world's languages are endangered (with less than 1000 speakers), and 'just 23 languages account for more than half the world's population'.

It is often surprising to discover which languages are genetically related and which are not. Nepali, a language of remote Nepal, is an Indo-European language, whereas Hungarian, surrounded on all sides by Indo-European languages, is not.

Some languages have no demonstrable genealogical relationship with other living languages. They are called *language isolates*. Basque, spoken in the Pyrenees Mountains between Spain and France, and Ainu, spoken on the island of Hokkaido, Japan, are among the 50 or so isolates mentioned in the *Ethnologue*. Many sign languages, insofar as it can be determined, are isolates.

It is not possible in an introductory text to give an exhaustive table of families, subfamilies and individual languages. Besides, some genetic relationships have not yet been firmly established. Linguists are, for example, divided as to whether Japanese and Turkish are related. We simply mention several language families in the following paragraphs with a few of their members. These language families do not appear to be related to one another or to Indo-European, although this may be an artefact of being unable to delve into the past far enough to see common features

Nostratic
A hypothetical language that is postulated as the first human language.

that time has erased. We cannot eliminate the possibility that the entire world's languages spring ultimately from a single source, an 'ur-language' that some have termed **Nostratic**, which is buried, if not concealed, in the depths of the past. Readers interested in this fascinating topic may wish to read the writings of Professor Johanna Nichols of the University of California, Berkeley. And as always, more can be found by googling *Nostratic*.

Uralic is the other major family of languages, besides Indo-European, spoken on the European continent. Hungarian, Finnish and Estonian are the major representatives of this group.

Afro-Asiatic languages comprise a large family spoken in northern Africa and the Middle East. They include the modern *Semitic* languages of Hebrew and Arabic, as well as languages spoken in biblical times, such as Aramaic, Babylonian, Canaanite and Moabite. A number of major languages of the Horn of Africa, such as Amharic, Tigre, Oromo and Somali, also belong to this family.

The *Sino-Tibetan* family includes Mandarin, the most populous language in the world, spoken by around one billion Chinese. This family also includes all of the Chinese dialects, as well as Burmese and Tibetan.

Most of the languages of Africa belong to the *Niger-Congo* family. These include more than 900 languages grouped into subfamilies, such as Kordofanian and Atlantic-Congo; the latter includes individual languages, such as Swahili and Zulu.

Nearly as numerous, the *Austronesian* family contains about 900 languages, spoken over a wide expanse of the globe, from Madagascar off the coast of Africa, to Hawaii. Hawaiian is an Austronesian language, as are Māori, spoken in New Zealand; Tagalog, spoken in the Philippine Islands; and Malay, spoken in Malaysia and Singapore, to mention just a few.

Surprisingly, the next most numerous family, called *Trans-New Guinea*, is crowded into the relatively small geographic area of New Guinea and neighbouring islands, and contains nearly 600 languages, most of them being Papuan languages. Therefore, three language families alone make up half of the languages spoken in the world.

Dozens of families and hundreds of languages are, or were, spoken in North and South America. Knowledge of the genetic relationships among these families of languages is often tenuous, and because so many of the languages are approaching extinction, there may be little hope for as thorough an understanding of the Amerindian language families as linguists have achieved for Indo-European.

Types of languages

> All the Oriental nations jam tongue and words together in the throat, like the Hebrews and Syrians. All the Mediterranean peoples push their enunciation forward to the palate, like the Greeks and the Asians. All the Occidentals break their words on the teeth, like the Italians and Spaniards.
>
> Isidore of Seville, seventh century CE

There are many ways to classify languages. One way already discussed in this chapter is according to the language family – the genetic classification. This method would be like classifying people according to whether they were related by blood. Another way of classifying languages is by certain linguistic traits, regardless of family. With people, this method would be like classifying them according to height and weight, political preference, religion, degree of wealth and so on.

So far in this book we have hinted at the widely varied ways that languages might be classified. From a phonological point of view, we have tone languages versus intonation languages – Thai versus English, for example. We have languages with varying numbers of vowel phonemes, from as few as three to as many as a dozen or more. Languages may be classified according to what combinations of consonants and vowels may comprise syllables. Japanese and Hawaiian allow few syllable types (CV and V, mostly), whereas English and most Indo-European languages allow a much wider variety. Languages may use length to contrast phonemes, or not. They may have nasal vowel phonemes, or not. They may have affricates, or not. They may use stress phonemically (English), or not (French).

From a morphological standpoint, languages may be classified according to the richness of verb and noun morphology. Vietnamese, for example, has little if any word morphology, so its words are monomorphemic; there are no plural affixes on nouns or agreement affixes on verbs. Such languages are referred to as isolating or analytic. Languages such as English have a middling amount of morphology, much less than Old English or Latin once had, or than Russian has today. Languages with more than one morpheme per word are called synthetic.

Some synthetic languages are **agglutinative**: words may be formed by a root and multiple affixes where the affixes are easily separated and always retain the same meaning. Swahili is such a language (see exercise 8, Chapter 4). The word *ninafika* is *ni* + *na* + *fika*, meaning 'I-present-arrive'; *ni* + *ta* + *fika* means 'I-will-arrive'; *wa* + *li* + *fika* means 'we-past-arrive'; and so on. Each morpheme is unchanging in form and meaning from one word to the next. Turkish is also an agglutinative language.

agglutinative language
A type of synthetic language in which words may be formed by a root and multiple affixes where the affixes are easily separated and always retain the same meaning.

In a fusional synthetic language the morphemes are, well, fused together, so it is hard to identify their basic shape. Many Indo-European languages are of this type, such as Spanish. In *hablo*, *hablan*, *hablé*, meaning 'I speak', 'they speak', 'I spoke', the affixes carry a fusion of the meanings 'person' and 'number' and 'tense' so that -*o* means 'first person, singular, present', -*an* means 'third person, plural, present' and -*e* means 'first person, singular, past'. The affixes themselves cannot be decomposed into the individual meanings that they bear.

Yet other languages – termed **polysynthetic** by linguists – have extraordinarily rich morphologies in which a single word may have 10 or more affixes and carry the semantic load of an entire English sentence. A number of Indigenous languages of Australia are polysynthetic, including Dalabon, Ngalakgan, Tiwi, Murrinhpatha, and Marrithiyel. For example, the Dalabon word *ngameykah* means 'I'll go this way, to where I picked that feller up'.[5] Many native languages of North America are polysynthetic, including Mohawk, Cherokee and Menominee. The Menominee word *paehtāwāēwesew* means 'He is heard by higher powers'.

From a lexical standpoint, languages are classifiable as to whether they have articles, such as *the* and *a* in English; as to their system of pronouns and what distinctions are made regarding person, number and gender; as to their vocabulary for describing family members; as to whether they have noun classes, such as the masculine, feminine and neuter nouns of German or the multiple noun classes present in Swahili that we observed in Chapter 4.

Every language has sentences that include a subject (S), an object (O) and a verb (V), although individual sentences may not contain all three elements. From the point of view of syntax, languages have been classified according to the basic or most common order in which these elements occur in sentences. There are six possible orders – SVO (subject–verb–object), SOV, VSO, VOS, OVS, OSV – that permit, in theory, six possible language types. Of these, SVO and SOV languages comprise nearly 90 per cent of investigated languages in roughly equal proportions. English, Spanish and Thai are SVO; German, Dutch and Japanese are SOV.

In SVO languages, auxiliary verbs precede main verbs, adverbs follow main verbs, and prepositions precede their head noun. Here are English examples:

They are eating. (Aux–V)

They sing beautifully. (V–Adv) (cf. *They beautifully sing.)

They are from Tokyo. (Prep–V)

In SOV languages, the opposite tendencies are true. Auxiliary verbs follow the main verb, adverbs precede main verbs, and 'prepositions', now called postpositions, follow their head noun. Here are Japanese examples:

Akiko	wa	sakana	o	tabete	iru (V–Aux)
Akiko	topic marker	fish	object marker	eating	is
Akiko is eating fish.					

Akiko	wa	hayaku	tabemasu	(Adv–V)
Akiko	topic marker	quickly	eats	
Akiko eats quickly.				

Akiko	wa	Tokyo	kara	desu	(V–PostP)
Akiko	topic marker	Tokyo	from	is	
Akiko is from Tokyo.					

These differences, and many more like them, stem from a single underlying parameter choice: the placement of the head of phrase. SVO languages are head final; SOV languages are head initial.

The question of why SVO and SOV languages are dominant is not completely understood, but linguists have observed that two principles or constraints are favoured:

1 Subjects precede objects.

2 There is a VP constituent – either VO or OV.

SVO and SOV are the only two types that obey both principles. The next most common type is VSO, here illustrated by Tagalog, which is widely spoken in the Philippines:

Sumagot	siya	sa	propesor
answered	he	the	professor
He answered the professor.			

VSO languages comprise nearly 10 per cent of languages investigated – the lion's share of what is left over after SVO and SOV languages. It is possible, however, that the VSO order is derived from an underlying order in which the verb and object are adjacent, so there is no violation of principle (2).

Malagasy, spoken on the island of Madagascar, has sentences that on the surface translate literally as the VOS sentence *put—the book on the table—the woman*, meaning 'The woman put the book on the table'. This would violate principle (1). However, linguists have shown that such sentences are derived from a deeper SVO order that is then transformed by a rule that postposes the S. Apparent OVS and OSV languages may also be derived from underlying orders that are either SVO or SOV and conform to the two principles, although this is controversial and remains a subject for linguistic research.

That a language is SVO does not mean that SVO is the only possible word order. The correlations between language type and the word order of syntactic categories in sentences are preferred word orders, and for the most part are violable tendencies. Different languages follow them to a greater or lesser degree. Therefore, when a famous comedian said 'Believe you me' on network TV, he was understood and imitated despite the VSO word order. Yoda, the Jedi Master of *Star Wars* fame, speaks a strange but perfectly understandable style of English that achieves its eccentricity by being OSV (objects may be complements other than noun phrases). Some of Yoda's utterances are:

Sick I've become.

Around the survivors a perimeter create.

Strong with the Force you are.

Impossible to see the future is.

When nine hundred years you reach, look as good you will not.

For linguists, the many languages and language families provide essential data for the study of Universal Grammar. Although these languages are diverse in many ways, they are also remarkably similar in many ways. We find that languages from northern Greenland to southern New Zealand, from the oriental nations to the occidental nations, all have similar sounds, similar phonological and syntactic rules, and similar semantic systems.

Why do languages change?

> Some method should be thought on for ascertaining and fixing our language forever … I see no absolute necessity why any language should be perpetually changing.
>
> Jonathan Swift (1667–1745)

> Stability in language is synonymous with rigor mortis.
>
> Ernest Weekley (1865–1954)

No-one knows exactly how or why languages change. As we have shown, linguistic changes do not happen suddenly. Speakers of English did not wake up one morning and decide to use the word *beef* for ‘ox meat’, nor do all the children of one particular generation grow up to adopt a new word. Changes are more gradual, particularly changes in the phonological and syntactic system.

For any one speaker, certain changes may occur instantaneously. When someone acquires a new word, it is not acquired gradually, although full appreciation for all of its possible uses may come slowly. When a new rule enters a speaker’s grammar, it is either in or not in the grammar. It may at first be an optional rule, so that sometimes it is used and sometimes it is not, possibly determined by social context or other external factors, but the rule is either there and available for use or not. What is gradual about language change is the spread of certain changes through an entire speech community.

A basic cause of change is the way children acquire the language. No-one teaches a child the rules of the grammar. Each child constructs a personal grammar alone, generalising rules from the linguistic input she or he receives. As discussed in Chapter 7, the child’s language develops in stages until it approximates the adult grammar. The child’s grammar is never exactly like that of the adult community because children receive diverse linguistic input. Certain rules may be simplified or overgeneralised, and vocabularies may show small differences that accumulate over several generations.

The older generation may be using certain rules optionally. At certain times they may say ‘It’s I’, at other times ‘It’s me’. The less formal style is usually used with children, who, as the next generation, may use only the *me* form of the pronoun in this construction. In such cases the grammar will have changed.

The reasons for some changes are relatively easy to understand. Before television there was no such word as *television*. It soon became a common lexical item. Borrowed words, too, generally serve a useful purpose and their entry into the language is not mysterious. Other changes are more difficult to explain, such as the Great Vowel Shift in English.

One plausible source of phonological change is *assimilation*, a kind of ease-of-articulation process in which one sound influences the pronunciation of an adjacent or nearby sound. Through assimilation, vowels before nasal consonants are frequently nasalised because it is easiest to lower the velum to produce nasality in advance of the actual consonant articulation. This results in the preceding vowel being nasalised. Once the vowel is nasalised, the contrast that the nasal consonant provided can be equally well provided by the nasalised vowel alone, and the redundant consonant may be deleted. The contrast between oral and nasal vowels that exists in many languages of the world today resulted from just such a historical sound change.

In reconstructing older versions of French, it has been hypothesised that *bol*, 'basin', *botte*, 'high boot', *bog*, 'a card game', *bock*, 'Bock beer' and *bon*, 'good', were pronounced [bɔl], [bɔt], [bɔg], [bɔk] and [bɔ̃n], respectively. The nasalised vowel in *bon* resulted from the final nasal consonant. Because of a conditioned sound change that deleted nasal consonants in word-final position, *bon* is pronounced [bɔ̃] in modern French. The nasal vowel alone maintains the contrast with the other words. Another example from English illustrates how such assimilative processes can change a language. In Old English, word-initial [kj] (like the initial sound of *cute*), when followed by /i/, was further palatalised to become our modern palatal affricate /ʧ/, as illustrated by the following words:

Old English (c = [kj])	Modern English (ch = [ʧ])
ciese	cheese
cinn	chin
cild	child

The process of palatalisation is found in the history of many languages. In Twi, the word meaning 'to hate' was once pronounced [ki]. The [k] became first [kj] and then finally [ʧ], so that today 'to hate' is [ʧi].

Ease-of-articulation processes, which make sounds more alike, are countered by the need to maintain contrast. Therefore sound change also occurs when two sounds are acoustically similar, with risk of confusion. We saw a sound change of /f/ to /h/ in an earlier example that can be explained by the acoustic similarity of [f] to other sounds. **Analogic change** is a generalisation of rules that results in a reduction of the number of exceptional or irregular morphemes that must be individually learnt and remembered. It was by analogy to *plough/ploughs* and *vow/vows* that speakers started saying *cows* as the plural of *cow* instead of the earlier plural *kine*. In effect, the plural rule became more general.

analogic change
A language change in which a rule spreads to previously unaffected forms, e.g. the plural of *cow* changed from the earlier *kine* to *cows* by the generalisation of the plural formation rule or by analogy to regular plural forms.

The plural rule continues to undergo analogic change, as exemplified by the regularisation of exceptional plural forms. We have borrowed words such as *datum/data*, *agendum/agenda*, *curriculum/curricula*, *memorandum/memoranda*, *medium/media*, *criterion/criteria* and *virtuoso/virtuosi*, to name just a few. The irregular plurals of these nouns are being replaced by regular plurals among many speakers: *agendas*, *curriculums*, *memorandums*, *criterias* and *virtuosos*. In some cases the borrowed original plural forms were considered to be the singular (as in *agenda* and *criteria*) and the new plural (e.g. *agendas*) is therefore a 'plural-plural'. In addition, many speakers now regard *data* and *media* as nouns that do not have plural forms, like *information*. All these changes are economy-of-memory changes; they lessen the number of irregular forms that must be remembered.

The past-tense rule is also undergoing generalisation. By analogy to *bake/baked* and *ignite/ignited*, many children and adults now say 'I *waked* last night' (instead of *woke*) and 'She *lighted* the bonfire' (instead of *lit*). These regular past-tense forms are found in today's dictionaries next to the irregular forms, with which they currently coexist. Assimilation and analogic change account for some linguistic changes, but they cannot account for others. Simplification and regularisation of grammars occur, but so do elaboration and complication. Old English rules of syntax became more complex; they imposed a stricter word order on the language, at the same time that case endings were being simplified. A tendency towards simplification is counteracted by the need to limit potential ambiguity. Much of language change is a balance between the two.

Language contact is also a vehicle of language change, particularly with respect to lexical changes due to borrowing, and also phonological changes, such as the introduction of new phonemes. As we saw earlier, /v/ came into English owing to its intimate contact with French following the Norman invasion.

Many factors contribute to linguistic change: simplification of grammars, elaboration to maintain intelligibility, borrowing and so on. Changes are actualised by children learning the language, who incorporate them into their grammar. The exact reasons for linguistic change are still elusive, although it is clear that the imperfect learning of adult dialects by children is a contributing factor. Perhaps language changes for the same reason all things change: it is the nature of things to change. As Heraclitus pointed out centuries ago, 'All is flux, nothing stays still. Nothing endures but change'.

CHAPTER REVIEW

Summary

All living languages change. Linguistic change, such as sound shift, is found in the history of all languages, as evidenced by the regular sound correspondences that exist between different stages of the same language, different dialects of the same language and different languages. Languages that evolve from a common source are genetically related. Genetically related languages were once dialects of the same language. English, German and Swedish, for example, were dialects of an earlier form of Germanic called Proto-Germanic, whereas earlier forms of Romance languages, such as Spanish, French and Italian, were dialects of Latin. Going back even further in time, earlier forms of Proto-Germanic, Latin and other languages were dialects of Indo-European.

All components of the grammar may change. Phonological, morphological, syntactic, lexical and semantic changes occur. Words, morphemes, phonemes and rules of all types may be added, lost or altered. The meaning of words and morphemes may broaden, narrow or shift. The lexicon may expand by borrowing, which results in loan words entering the vocabulary. It also grows through word coinage, blends, compounding, acronyms and other processes of word formation. On the other hand, the lexicon may shrink as certain words, such as *typewriter*, are rarely used and eventually become obsolete.

The study of linguistic change is called historical and comparative linguistics. Linguists use the comparative method to identify regular sound correspondences among the cognates of related languages and systematically reconstruct an earlier protolanguage. This comparative reconstruction allows linguists to peer backwards in time and determine the linguistic history of a language family, which may then be represented in a tree diagram similar to the one in **Figure 10.3**.

Recent estimates place the number of languages in the world today at somewhat less than 7000, plus 100 or more sign languages. These languages are grouped into families, subfamilies and so on, based on their genetic relationships. A vast number of these languages are dying out because in each generation fewer children learn them. However, attempts are being made to preserve dying languages and dialects for the knowledge they bring to the study of Universal Grammar and the culture in which they are spoken.

Languages may also be classified according to certain characteristics, such as rich versus impoverished morphology (analytic versus synthetic), or whether their basic word order is subject–verb–object (SVO) like English, subject–object–verb (SOV) like Japanese, or some other order.

No-one knows all the causes of linguistic change. Some sound changes result from assimilation, a fundamentally physiological process of ease of articulation. Others, like the Great Vowel Shift, are more difficult to explain. Some grammatical changes are analogic changes, generalisations that lead to more regularity, such as *cows* instead of *kine* and *waked* instead of *woke*.

Change comes about through the restructuring of the grammar by children learning the language. Grammars may appear to change in the direction of simplicity and regularity, as in the loss of the Indo-European case morphology, but such simplifications may be compensated for by other complexities, such as stricter word order. A balance is always present between simplicity – languages must be learnable – and complexity – languages must be expressive and relatively unambiguous.

Exercises

1 Many changes in the phonological system have occurred in English since 449 CE. Below are some Old English words (given in their spelling and phonetic forms) and the same words as we pronounce them today. They are typical of regular sound changes that took place in English. What sound changes have occurred in each case?

Example:	OE *hlud* [xluːd]	→	Mod. Eng. *loud*
Changes:	(1) The [x] was lost.		
	(2) The long vowel [uː] became [aʊ].		

	Old English	→	Modern English
a	crabba [kraba]	→	crab
b	fisc [fɪsk]	→	fish
c	fūl [fu:l]	→	foul
d	gāt [ga:t]	→	goat
e	lǣfan [læ:van]	→	leave
f	tēþ [te:θ]	→	teeth

2 The Great Vowel Shift left its traces in Modern English in such meaning-related pairs as:
   a serene/serenity [i:]/[e]
   b divine/divinity [ɑe] [aɪ]/[ɪ]
   c sane/sanity [æɪ] [eɪ]/[æ].

   List five such meaning-related pairs that relate [i] and [e] as in example (a), [ɑe] [aɪ] and [ɪ] as in example (b) and [æɪ] [eɪ] and [æ] as in example (c).

3 Below are some sentences taken from Old English, Middle English and early Modern English texts, illustrating some changes that have occurred in the syntactic rules of English grammar. (*Note*: In the sentences, the earlier spelling forms and words have been changed to conform to Modern English; that is, the OE sentence *His suna twegen mon brohte to tæm cynige* would be written as *His sons two one brought to that king*, which in Modern English would be *His two sons were brought to the king*.) Underline the parts of each sentence that differ from Modern English and rewrite the sentence in Modern English. State, if you can, what changes must have occurred.

Example:	It *not* belongs to you. (Shakespeare, *Henry IV*)
Modern English:	It does not belong to you.
Change:	At one time, a negative sentence simply had a *not* before the verb. Today, the word *do*, in its proper morphological form, must appear before the *not*.

   a It nothing pleased his master.
   b He hath said that we would lift them whom that him please.
   c I have a brother is condemned to die.
   d I bade them take away you.
   e I wish you was still more a Tartar.
   f Christ slept and his apostles.
   g Me was told.

4 It is not unusual to find a yearbook or almanac (including ones online) publishing a new word list. In recent years several new words, such as *Brexit*, *webisode*, *frenemy* and *staycation* were said to have entered the English language. Before that new words, such as *byte* and *modem* arrived together with the computer age. Other words have been expanded in meaning, such as *memory* to refer to the storage part of a computer and *crack* meaning a form of cocaine. Harry Potter's world has donated *apparate* and *muggle*, among others. Some fairly recent arrivals that came with the new millennium include *Viagra*, *Sudoku* and the controversial *fracking* (from *hydraulic fracturing*, meaning 'to free oil and gas from rock').
   a Think of five other words or compound words that have entered the language in the last ten years. Briefly describe the source of the word.
   b Think of three words that might be on the way out. (*Hint*: Consider *flapper*, *groovy* and *slay/slew*. Dictionary entries that indicate 'archaic' are a good source.)
   c Think of three words whose dictionary entries do not say they are verbs, but which you have heard or seen used as verbs. *Example*: 'He went to piano over at the club', meaning (we guess) 'He went to play the piano at the club'.
   d Think of three words that have become, or are becoming, obsolete due to changes in technology. *Example*: *Mimeograph*, a method of text reproduction, is on the way out due to advances in xerographic duplication technology.

e One of the trendy words of the current millennium is *power* as used prolifically, if not productively, in new compounds, such as *power walk* and *power lunch*. Find five or ten such usages and document a reference where you observed each usage, such as a magazine article or a news report on the radio, internet or television.

f Now that *blog* is a fully-fledged word both as a noun and a verb, it may become the root for many more words through the attachment of prefixes and suffixes. Some of these stem (pardon the pun) from productive affixes: *reblog*, 'to blog again', *blogify*, 'to write a blog about something', *non-blog*, 'writing that isn't a blog, such as this exercise', *blogness*, 'the quality of being a blog'. Using affixes, make up some words and definitions with *blog*, say five or ten. Use your imagination! E.g. *blogaroo*, 'a blogger who writes about rodeos', or *blogorama*, 'a blog with a wide vista'.

5 Here is a table showing, in phonemic form, the Latin ancestors of 10 words in modern French (given in phonetic form):

Latin	French	Gloss
kor	kør	heart
kantāre	ʃãte	to sing
klārus	klɛr	clear
kervus	sɛr	deer
karbō	ʃarbõ	coal
kwandō	kã	when
kentum	sã	hundred
kawsa	ʃoz	thing
kinis	sãdrə	ashes
kawda/koda[6]	kø[7]	tail

Are the following statements true or false?

a The modern French word for *thing* shows that a /k/ that occurred before the vowel /o/ in Latin became [ʃ] in French.

b The French word for *tail* probably derived from the Latin word /koda/ rather than from /kaʊda/.

c One historical change illustrated by these data is that [s] became an allophone of the phoneme /k/ in French.

d If there were a Latin word *kertus*, the modern French word would probably be [sɛr] (consider only the initial consonant).

6 Here is how to count to five in a dozen languages, using standard Roman alphabet transcriptions. Six of these languages are Indo-European and six are not. Which are Indo-European?

	L1	L2	L3	L4	L5	L6
1	en	jedyn	i	eka	ichi	echad
2	twene	dwaj	liang	dvau	ni	shnayim
3	thria	tři	san	trayas	san	shlosha
4	fiuwar	ʃtyri	ssu	catur	shi	arbaʔa
5	fif	pjeć	wu	pa–	go	chamishs
	L7	**L8**	**L9**	**L10**	**L11**	**L12**
1	mot	ün	hana	yaw	uno	nigen
2	hai	duos	tul	daw	dos	khoyar
3	ba	trais	set	dree	tres	ghorban
4	bon	quatter	net	tsalo	cuatro	durben
5	nam	tschinc	tasŏt	pindz	cinco	tabon

7 The vocabulary of English consists of native words as well as thousands of loan words. Look up the following words in a dictionary that provides etymologies. Speculate how each word came to be borrowed from the particular language.

***Example*: *kangaroo* was a word in an Aboriginal language for an animal unfamiliar to the British colonists, so they borrowed that word into their vocabulary so they could refer to the creature.**

a	size	**h**	robot	**o**	skunk	**v**	pagoda
b	royal	**i**	check	**p**	catfish	**w**	khaki
c	aquatic	**j**	banana	**q**	hoodlum	**x**	shampoo
d	heavenly	**k**	keel	**r**	filibuster	**y**	kangaroo
e	skill	**l**	fact	**s**	astronaut	**z**	bulldoze
f	ranch	**m**	potato	**t**	emerald		
g	blouse	**n**	muskrat	**u**	sugar		

8 In the text, we mentioned that words such as *billabong*, *currawong*, *dingo*, and *waratah* were borrowed from Aboriginal languages. Identify 10 more words such as these and for each word (including the examples provided), identify the name of the Aboriginal language the word was borrowed from and where the language was spoken. You may consult Dixon *et al.* (2006), and the Macquarie dictionary, among other sources.

9 'Analogic change' refers to a tendency to generalise the rules of language, a major cause of language change. We mentioned two instances, the generalisation of the plural rule (*cow/kine* becoming *cow/cows*) and the generalisation of the past-tense formation rule (*light/lit* becoming *light/lighted*). Think of at least three other instances of non-standard usage that are analogic; they are indicators of possible future changes in the language. (*Hint*: Consider fairly general rules and see if you know of dialects or styles that overgeneralise them, for example, comparative formation by adding *-er*.)

10 What is the difference between 'language isolates' and 'language families'? As a starting point, consult the paper by Campbell (2010) given in the 'Further Reading' section of this chapter.

11 **Challenge exercise:** Discuss the scope and some of the limitations of the comparative method as a technique of establishing the genetic relationship between languages. (See Dixon, 1997 for some discussion.)

12 Linguists have noted the 'paradox' that sound change is regular but produces irregularity, and analogic change is irregular but produces regularity. Explain what this means and illustrate your explanation with specific examples. (*Hint*: Revisit exercises 2 and 9.)

13 Study the following passage from Shakespeare's *Hamlet*, Act IV, Scene iii, and identify every difference in expression between Elizabethan and current Modern English that is evident (e.g. in line 3, *thou* is now *you*).

Hamlet: **A man may fish with the worm that hath eat of a king, and eat of the fish that hath fed of that worm.**
King: **What dost thou mean by this?**
Hamlet: **Nothing but to show you how a king may go a progress through the guts of a beggar.**
King: **Where is Polonius?**
Hamlet: **In heaven. Send thither to see. If your messenger find him not there, seek him i' the other place yourself. But indeed, if you find him not within this month, you shall nose him as you go up the stairs into the lobby.**

14 Travellers to Spain who know a little Latin American Spanish are often surprised to encounter a small number of speakers who appear to have a lisp. That is, they pronounce an expected [s] as [θ], and moreover they pronounce an expected [j] as a *ly* or palatal lateral whose IPA symbol is [ʎ]. Of course, if you have read this book you know that this is a dialectal variation. Consider the following data from two dialects of Spanish:

Dialect 1	Dialect 2	Gloss	Earlier form (to be completed)
[kasa]	[kaθa]	hunt (noun)	*
[si]	[si]	yes	*
[gajo]	[gaʎo]	rooster	*
[dies]	[dieθ]	ten	*

[pojo]	[pojo]	kind of bench	*
[kaje]	[kaʎe]	street	*
[majo]	[majo]	May	*
[kasa]	[kasa]	house	*
[siŋko]	[θiŋko]	five	*
[dos]	[dos]	two	*
[pojo]	[poʎo]	chicken	*

a Find the correspondence sets – there are 14 of them, for example *p–p*.
b Reconstruct each of the 14 protosounds, e.g. **p*.
c What, if any, are the sound changes that took place in the two dialects?
d Complete the table by filling in the reconstructed earlier forms.

15 Here are some data from four Polynesian languages:

Māori	Hawaiian	Samoan	Fijian	Gloss
pou	pou	pou	bou	post
tapu	kapu	tapu	tabu	forbidden
taŋi	kani	taŋi	taŋi	cry
takere	kaʔele	taʔele	takele	keel
hono	hono	fono	vono	stay, sit
marama	malama	malama	malama	light, moon
kaho	ʔaho	ʔaso	kaso	thatch

a Find the correspondence sets. (*Hint*: There are 14, for example: *o–o–o–o, p–p–p–b*.)
b For each correspondence set, reconstruct a protosound. Mention any sound changes that you observe. For example:

o–o–o–o	**o*
p–p–p–b	**p* → *b* in Fijian.

c Write the reconstructed words in Proto-Polynesian.

16 Consider these data from two Native American languages.

Yerington Paviotso = YP	Northfork Monachi = NM	Gloss
mupi	mupi	nose
tama	tawa	tooth
piwɨ	piwɨ	heart
sawapono	sawaʔpono	a feminine name
nɨmɨ	nɨmɨ	liver
tamano	tawano	springtime
pahwa	pahwa	aunt
kuma	kuwa	husband
wowaʔa	wowaʔa	Indians living to the west
mɨhɨ	mɨhɨ	porcupine
noto	noto	throat
tapa	tape	sun
ʔatapɨ	ʔatapɨ	jaw
papiʔi	papiʔi	older brother

patɨ	petɨ	daughter
nana	nana	man
ʔatɨ	ʔetɨ	bow, gun

a Identify each sound correspondence. (*Hint*: There are 10 correspondence sets of consonants and six correspondence sets of vowels, e.g. *p–p, m–w, a–a* and *a–e*.)

b i For each correspondence you identified in (a) not containing an *m* or *w*, reconstruct a proto-sound (e.g. for *h–h*, *h; *o–o*, *o).

ii If the protosound underwent a change, indicate what the change is and in which language it took place.

c i Whenever a *w* appears in YP, what appears in the corresponding position in NM?

ii Whenever an *m* occurs in YP, what two sounds may correspond to it in NM?

iii On the basis of the position of *m* in YP words, can you predict which sound it will correspond to in NM words? How?

d i For the three correspondences you discovered in (a) involving *m* and *w*, should you reconstruct two or three protosounds?

ii If you chose three protosounds, what are they and what did they become in the two daughter languages, YP and NM?

iii If you chose two protosounds, what are they and what did they become in the daughter languages? What further statement do you need to make about the sound changes? (*Hint*: One protosound will become two different pairs, depending on its phonetic environment. It is an example of a conditioned sound change.)

e Based on the above, reconstruct all the words given in the common ancestor from which both YP and NM descended (e.g. *porcupine* is reconstructed as *mɨhɨ).

17 Briefly describe the difference between *borrowing* and *loan translation*. Provide examples from English or any other language(s) you are familiar with.

18 In the text we stated: 'English has replaced its depleted case system with an equally expressive system of prepositions. For example, the dative case is often indicated by the preposition *to* and the genitive case by the preposition *of*'. Provide the English prepositions that are used to indicate the following cases:

a Instrumental

b Comitative

c Allative.

19 The people of the Isle of Eggland once lived in harmony on a diet of soft-boiled eggs. They spoke Proto-Egglish. Contention arose over which end of the egg should be opened first for eating, the big end or the little end. Each side retreated to its end of the island and spoke no more to the other. Today, Big-End Egglish and Little-End Egglish are spoken in Eggland. Below are data from these languages.

a Find the correspondence sets for each pair of cognates and reconstruct the Proto-Egglish word from which the cognates descended.

b Identify the sound changes that have affected each language. Use *classes* of sounds to express the change when possible. (*Hint*: There are three conditioned sound changes.)

Big-End Egglish	Little-End Egglish	Gloss	Proto-Egglish (to be completed)
ʃur	kul	omelette	*
ve	vet	yolk	*
rɔ	rɔk	egg	*
ver	vel	eggshell	*
ʒu	gup	soufflé	*
vel	vel	egg white	*
pe	pe	hard-boiled (obscene)	*

20 **Challenge exercise:** In the text, we discussed how language contact can be a vehicle to language change. In some cases, language contact may lead to the emergence of a new language. In the Australian context, a language known as Light Warlpiri has recently emerged out of the contact situation between the Aboriginal language Warlpiri and English. Research this language and phenomenon, starting from O'Shannessy (2020), and write a short essay.

21 **Challenge exercise:** We discussed that languages can be classified in terms of their word order, that is, the order between the three syntactic constituents, S(ubject), O(bject), V(erb). English, for example, is an SVO language, whereas Japanese is an SOV language. Given the three constituents, there are six logical possibilities for languages (SVO, SOV, VSO, VOS, OSV, OVS) and all these orders are attested in the languages of the world. However, there are also languages that appear to allow all the six possibilities. These languages are sometime referred to as 'free/flexible' word order (also 'non-configurational') languages. One such language is Nunggubuyu, an Indigenous language of northern Australia. Write a short essay on the topic of free/flexible word order languages. You may start your research from the World Atlas of Language Structure (WALS) Online: https://wals.info/chapter/81.

22 There are some exceptions to the Adj–Noun order in Modern English, as the examples in column A and B illustrate:

A	B	
a man alone	*an alone man	a lone man
no man alive	*no alive man	no live man
a lion asleep	*an asleep lion	a sleeping lion

a Can you identify a common feature of the adjectives that are grammatical in post-noun position?
b Provide some other examples like those in column A.
c The expressions in column C have the normal Adj-N order. Do they have the same meaning as their respective items in column A? If not, say how they are different.

23 In this chapter we mentioned that a number of English words have been borrowed indirectly from Arabic, including words such as *alcohol, algebra, cipher* and *zero*. Provide five more examples of words of Arabic origin in English.

24 Consider the following Latin and Greek words. Each of them has provided a root for many English words. Give three examples of English words derived from each of the Latin and Greek roots below (the root is in boldface). (*Note:* The English word need not begin with the root, e.g. *depose* is derived from the Latin *positus*.)
Example: Latin *pater*, 'father': English *paternal*, *patricide*, *expatriate*. Note that *paternalistic*, *paternalistically* and other morphological derivations of *paternal* do not count.

Greek		Latin	
pente	five	**acer**	sharp
anthropos	man	**mater**	mother
arche	beginning	**bell**um	war
pathos	feeling	**arbor**	tree
morphe	shape	**pos**itus	put, place
exo	outside	**par**	equal
sophos	wise	**nep**os	grandson
gamos	marriage	**tac**ere	to be silent
logy	word	**scrib**ere	to write
gigas	huge, enormous	**ling**ua	tongue, language

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Weblinks

- http://www.alphadictionary.com/blog/?cat=10 – This is an archive for language change with fun discussions of various topics on language change, such as 'Will English become unreadable?', 'A new function for the suffix -en', or 'How's 'Yall' doing?'.
- https://aiatsis.gov.au/explore/living-languages – At this site you will find printed material written in Australian Indigenous languages.
- https://livingarchive.cdu.edu.au – This site is home to the digital archive of endangered literature in Australian Indigenous languages of the Northern Territory.
- http://www.word-detective.com – This fun site tries to figure out the meaning of obscure words and expressions like: Puzzled by Posh?, Confounded by Cattycorner?, Baffled by Balderdash?, Flummoxed by Flabbergast?, Perplexed by Pandemonium?, Annoyed by Alliteration? Take a look.
- http://goodlingos.com/sayings – This site explains the origins of some of the English sayings and customs we're accustomed to. Some of the items include the clink, black market, cut through the red tape, and many more.
- https://www.ethnologue.com – The *Ethnologue* is a catalogue of the world's languages. It is an extraordinary source of information about all languages – where they are spoken, by how many people, and what family they belong to. Much of the data about speakers and locations presented in this chapter actually come from the Ethnologue. This website, which is maintained by the Summer Institute of Linguistics, includes a Language Name Index and a Language Family Index.
- https://people.umass.edu/sharris/in/gram/GrammarBook/Pronunciation.html – This site allows you to listen to the pronunciation of Old English.
- http://www.omniglot.com/writing/navajo.htm – Click here to learn about Navajo (sometimes also spelt 'Navaho'), an indigenous language of the American southwest, and become familiar with the sounds of the language.

Endnotes

1 The letter þ is called *thorn* and is pronounced [θ] in this example.
2 The asterisk before a letter indicates a reconstructed sound, not an unacceptable form. This use of the asterisk occurs only in this chapter.
3 The empty angled brackets indicate a loss of the sound.
4 Bowern, C 2010, 'Historical linguistics in Australia: trees, networks and their implications'. *Philosophical Transactions of the Royal Society B*, *365*(1559): 3845–3854.
5 œ and ø are front, rounded vowels.
6 Evans, N 2017, 'Polysynthesis in Dalabon', in M Fortescue, M Mithun and N Evans (eds), The Oxford handbook of polysynthesis, Oxford University Press, Oxford: 759–781.
7 /kawda/ and /koda/ are the word for *tail* in two Latin dialects.

Writing: the ABCs of language

11

The Moving Finger writes; and, having writ,
Moves on: nor all thy Piety nor Wit
Shall lure it back to cancel half a Line
Nor all thy Tears wash out a Word of it.

Omar Khayyám, *Rubáiyát*, c. 1080 (trans. Edward FitzGerald, 1859)

The palest ink is better than the sharpest memory.

Chinese proverb

Learning objectives

After reading Chapter 11, you should be able to:

- understand the historical development of writing from the evolution of pictographs to alphabetic systems
- understand the properties of modern writing systems in representing sounds and meanings
- understand the relationship between speech and writing.

Throughout this book we have emphasised the spoken/sign form of language. The grammar, which represents one's linguistic knowledge, is viewed as a system for relating sound (sign) and meaning. The ability to acquire and use language represents a vital evolutionary development. No individual or peoples discovered or created language. The human language faculty appears to be biologically and genetically determined.

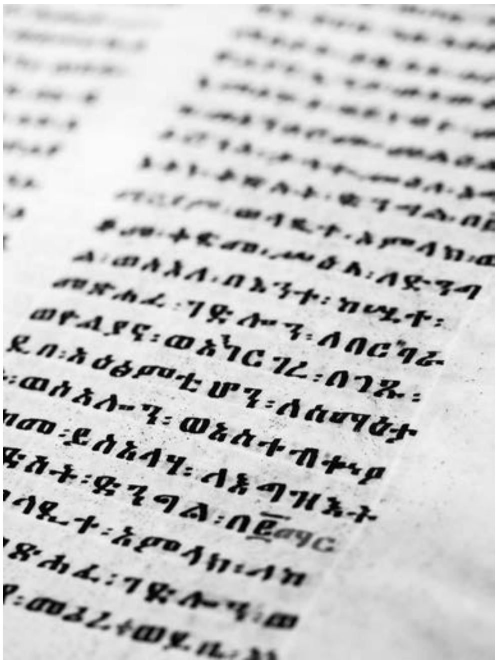
This is not true of the written form of human languages. Children learn to speak naturally through exposure to language, without formal teaching. To become literate – to learn to read and write – one must make a conscious effort and receive instruction.

Before the invention of writing, useful knowledge had to be memorised. Messengers carried information in their heads. Crucial lore passed from the older to the newer generation through speaking. Even in today's world many spoken languages lack a writing system and oral literature still abounds. However, human memory is short-lived and the brain's storage capacity is limited.

Writing overcomes such problems and allows communication across space and through time. Writing permits a society to permanently record its literature, its history, its science and its technology. The creation and development of writing systems is therefore one of the greatest of human achievements.

By *writing* we mean any of the many visual (non-gestural) systems for representing language, including handwriting, printing and electronic displays of these written forms (see **Figure 11.1**). It might be argued that writing is becoming obsolete because we have electronic means of recording sound and cameras to produce films and television. But if writing became extinct, there would be no knowledge of electronics for engineers to study; there would be, in fact, little technology in years to come. There would be no film or television scripts, no literature, no books, no mail, no newspapers. There would be some advantages – no junk mail, poison-pen letters or fine print – but the losses would far outweigh the gains.

Figure 11.1 An image of the Ethiopic writing system



Shutterstock.com/Magdalena Paluchowska

The history of writing

> An Egyptian legend relates that when the god Thoth revealed his discovery of the art of writing to King Thamos, the good King denounced it as an enemy of civilization. 'Children and young people,' protested the monarch, 'who had hitherto been forced to apply themselves diligently to learn and retain whatever was taught them, would cease to apply themselves, and would neglect to exercise their memories.'
>
> Will Durant, *The Story of Civilization*, vol. 1, 1935

There are many legends and stories about the invention of writing. Greek legend has it that Cadmus, Prince of Phoenicia and founder of the city of Thebes, invented the alphabet and brought it with him to Greece. In one Chinese fable, the four-eyed dragon-god Cang Jie invented writing, but in another, writing first appeared as markings on the back of the *chi-lin*, a white unicorn of Chinese legend. In other myths, the Babylonian god Nebo and the Egyptian god Thoth gave humans writing as well as speech. The Talmudic scholar Rabbi Akiba believed that the alphabet existed before humans were created, and according to Islamic teaching the alphabet was created by Allah himself, who presented it to humans but not to the angels.

Although these are delightful stories, it is evident that before a single word was written, uncountable billions were spoken. The invention of writing came relatively late in human history and its development was gradual. It is highly unlikely that a particularly gifted ancestor awoke one morning and decided, 'Today I'll invent a writing system'.

Pictograms and ideograms

> One picture is worth a thousand words.
>
> Chinese proverb

The seeds from which writing developed were probably the early drawings made by ancient humans. Cave drawings, called **petroglyphs**, such as those found in the Altamira cave in northern Spain drawn by humans living more than 20 000 years ago, can be read today. They are literal portrayals of life at that time. We do not know why they were produced; they could be aesthetic expressions rather than pictorial communications. Later drawings are clearly 'picture writings', or **pictograms**. Unlike modern writing systems, each picture or pictogram is a direct image of the object it represents. There is a non-arbitrary relationship between the form and meaning of the symbol. Comic strips minus captions are pictographic – literal representations of the ideas to be communicated. This early form of writing represented objects in the world directly rather than through the linguistic names given to these objects. Therefore they did not represent the words and sounds of spoken language.

petroglyph
A drawing on rock made by prehistoric people.

pictogram
A form of writing in which the symbols resemble the objects represented; a non-arbitrary form of writing.

Pictographic writing has been found throughout the world – ancient and modern – among Africans; Native Americans, including the Inuit of Alaska and Canada; the Aboriginals of Australia; the Incas of Peru; the Yukagirians of Siberia and the people of Oceania. Pictograms are used today as international road signs where the native language of the region might not be understood by all travellers. Such symbols can be understood quickly by anyone because they do not depend on the words of any language. To understand the signs used by the various national park authorities (see Figure 11.2), for example, a visitor does not need to know English.

Figure 11.2 **Six of a set of symbols from the NSW National Parks and Wildlife Service for use as signs to indicate activities and facilities in parks and recreation areas. These are (left to right): walking track, kiosk, camping, Aboriginal site, swimming, picnic area. Certain symbols are available with the prohibiting slash, a diagonal red bar across the symbol that means the activity is forbidden.**

Once a pictogram was accepted as the representation of an object, its meaning was extended to attributes of that object or to concepts associated with it. A picture of the sun could represent warmth, heat, light, daytime and so on. Pictograms therefore began to represent ideas rather than objects. Such generalised pictograms are called **ideograms** ('idea pictures' or 'idea writing').

The difference between pictograms and ideograms is not always clear. Ideograms tend to be less direct representations, and one may have to learn what a particular ideogram means. Pictograms tend to be more literal. The 'No parking' symbol, for example, consisting of a black letter P inside a red circle with a slanting red line through it, is an ideogram. It represents the idea of no parking abstractly. A no-parking symbol showing a car being towed away is more literal, and more like a pictogram.

ideogram, ideograph
A character of a word-writing system, often highly stylised, that represents a concept, or the pronunciation of the word representing that concept.

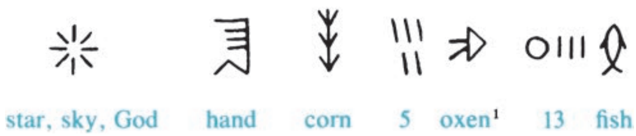
Inevitably, pictograms and ideograms became stylised and formulaic so that most people could read them. The simplifying conventions that developed so distorted the literal representations that it was no longer easy to interpret symbols without learning the system. The ideograms became linguistic symbols as they came also to stand for the sounds that represented the ideas – that is, for the words of the language. This stage represented a revolutionary step in the development of writing systems.

Cuneiform writing

> Bridegroom, let me caress you
> My precious caress is more savoury than honey
> In the bed chamber, honey-filled,
> Let me enjoy your goodly beauty
> Lion, let me caress you.
>
> Translation of a Sumerian poem written in cuneiform

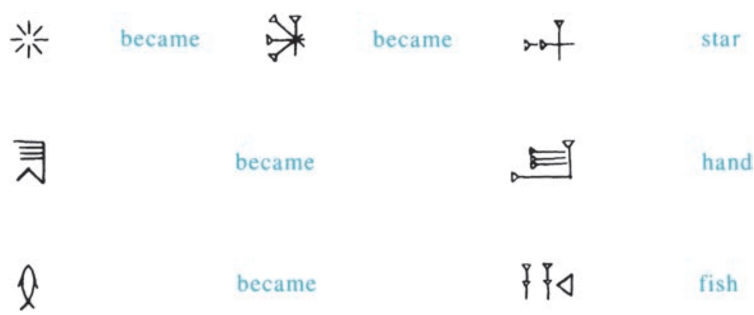
Much of what we know about writing stems from the records left by the Sumerians, an ancient people of unknown origin who built a civilisation in southern Mesopotamia (modern Iraq) more than 6000 years ago. They left innumerable clay tablets containing business documents, epics, prayers, poems, proverbs and so on. So copious are these written records that scholars studying the Sumerians are publishing a 17-volume dictionary of their written language. The first of these volumes appeared in 1984.

The writing system of the Sumerians is the oldest one known. They were a commercially oriented people and, as their business deals became increasingly complex, the need for permanent records arose. An elaborate pictography was developed, along with a system of tallies. Some examples are shown here:



Over the centuries the Sumerians simplified and conventionalised their pictography. They began to produce the symbols of their written language by using a wedge-shaped stylus that was pressed into soft clay tablets. The tablets hardened in the desert sun to produce permanent records that were far hardier than modern paper or electronic documents. This form of writing is called **cuneiform** – literally, 'wedge shaped' (from Latin *cuneus*, 'wedge'). Here is an illustration of the evolution of Sumerian pictograms to cuneiform:

cuneiform
A form of writing in which the characters are produced using a wedge-shaped stylus.

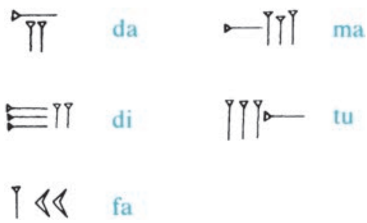


The cuneiform symbols in the right-most column do little to remind us (or the Sumerians) of the meaning represented. As cuneiform evolved, its users began to think of the symbols more in terms of the name of the thing represented than of the thing itself. Eventually cuneiform script came to represent words of the language. Such a system is called logographic, or **word writing**. In this oldest type of writing system, the symbol stands for both the word and the concept, which it may still resemble, however abstractly. Therefore **logograms**, the symbols of a word-writing system, are ideograms that represent, in addition to the concept, the word or morpheme in the language for that concept.

The cuneiform writing system spread throughout the Middle East and Asia Minor. The Babylonians, Assyrians and Persians borrowed it. In adopting cuneiform characters, the borrowers often used them to represent the sounds of the syllables in their own languages. In this way cuneiform evolved into a **syllabic writing** system.

In a syllabic writing system, each syllable in the language is represented by its own symbol, and words are written syllable by syllable. Cuneiform writing was never purely syllabic. A large residue of symbols remained that stood for whole words. The Assyrians retained a large number of word symbols, even though every word in their language could be written out syllabically if desired. Therefore they could write  *mātu*, 'country', as:

The Persians (c. 600–400 BCE) devised a greatly simplified syllabic alphabet for their language, which made little use of word symbols. By the reign of Darius I (522–468 BCE) this writing system was in wide use. The following characters illustrate it:



word writing
A system of writing in which each character represents a word or **morpheme** of the language, e.g. Chinese; also called logographic writing.

logograms
The symbols of a **word-writing** or logographic writing system.

syllabic writing
A writing system in which each syllable in the language is represented by its own symbol, e.g. **hiragana** in Japanese.

The invention, use and acceptance of **emoticons** reflect on a small scale how a writing system such as cuneiform might have spread throughout a country. However, emoticons have now become largely irrelevant, and their function has been replaced by a more elaborate system of emojis (see **Figure 11.3**). An **emoji**, a term borrowed from Japanese, is defined as 'a small digital image or icon used to express an idea, emotion, etc., in electronic communications'. Comparing emoticons with emojis, the linguist Gretchen McCulloch comments:[2]

> Emoticons are supremely easy to type, since they're made of punctuation already on your keyboard, but there's only so many recognizable figures you can make out of punctuation characters. Emoticons are good for your basic couple of smiley faces, but they become less practical as they get more elaborate ... your most-used emoji show up in their own, easy-to-access section of your emoji picker, but there's also more there if you want to go exploring.

As McCulloch further elaborates, emojis are easy to use, copy and paste, and move around between different devices, and they blend in with the related text easily.

emoticon
A string of text characters that, when viewed sideways, forms a face expressing a particular emotion, frequently used in email.

emoji
A small image or icon used in SMS, email and other forms of electronic communication, to express an idea or emotion, among other things.

Figure 11.3 Emoji

Shutterstock.com/PremiumVector

The rebus principle

phonographic symbol
A symbol in a writing system that stands for the sounds of a word.

rebus principle
In writing, the use of a **pictogram** for its phonetic value, e.g. using a picture of a bee to represent the verb *be* or the sound [b].

When a graphic sign no longer has a visual relationship to the word it represents, it becomes a **phonographic symbol**, standing for the sounds that represent the word. A single sign can then be used to represent all words with the same sounds – the homophones of the language. If, for example, the symbol ⊙ stood for *sun* in English, it could then be used in a sentence such as *My* ⊙ *is a doctor.* This sentence is an example of the **rebus principle**.

A rebus is a representation of words by pictures of objects whose names sound like the word. Therefore might represent *eye* or the pronoun *I*. The sounds of the two words are identical, even though the meanings are not. Similarly, could represent *belief* (*be* + *lief* = *bee* + *leaf* = /biː/ + /liːf/) and could be *believes*.

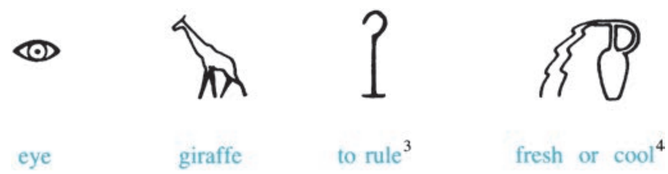
Proper names can also be written in such a way. If the symbol is used to represent *rod* and the symbol represents *man*, then could represent *Rodman*, although nowadays the name is unrelated to either rods or men. Such combinations often become stylised or shortened so as to be more easily written. *Rodman*, for example, might be written in such a system as or even .
Jokes, riddles and advertising make use of the rebus principle; for example, signs often advertise something '4 sale'.

However, this is not an efficient system because in many languages words cannot be divided into sequences of sounds that have meaning by themselves. It would be difficult, for example, to represent the word *English* (/ɪŋ/ + /glɪʃ/) in English according to the rebus principle. *Eng* by itself does not mean anything, nor does *glish*.

From hieroglyphics to the alphabet

At the time that Sumerian pictography was flourishing (around 4000 BCE), a similar system was being used by the Egyptians, which the Greeks later called **hieroglyphics** (*hiero,* 'sacred' + *glyphikos,* 'carvings'). These sacred carvings originated as pictography, as shown by the following:

hieroglyphics
A pictographic writing system used by the Egyptians around 4000 BCE.



Eventually, these pictograms came to represent the concept and the word for the concept. Once this happened, hieroglyphics became a bona fide logographic writing system. Through the rebus principle, hieroglyphics also became a syllabic writing system.

The Phoenicians, a Semitic people who lived in what is today Lebanon, were aware of hieroglyphics as well as the offshoots of Sumerian writing. By 1500 BCE they had developed a writing system of 22 characters, the West Semitic Syllabary. Mostly, the characters stood for consonants alone (*Cn y rd ths?*). The reader provided the vowels, and hence the rest of the syllable, through knowledge of the language. Therefore the West Semitic Syllabary was both a **syllabary** and a **consonantal alphabet**.

syllabary
The symbols of a **syllabic writing** system.

The ancient Greeks tried to borrow the Phoenician writing system, but it was unsatisfactory as a syllabary because Greek has too complex a syllable structure. In Greek, unlike Phoenician, vowels cannot be determined by grammatical context, so a writing system for Greek required that vowels have their own independent representations. Fortuitously, Phoenician had more consonants than Greek, so when the Greeks borrowed the system they used the leftover consonant symbols to represent vowel sounds. The result was **alphabetic writing**, a system in which both consonants and vowels are symbolised. (The word *alphabet* is derived from *alpha* and *beta*, the first two letters of the Greek alphabet.)

alphabetic writing
A writing system in which each symbol typically represents one sound segment.

Most alphabetic systems in use today derive from the Greek system. The Etruscans knew this alphabet and through them it became known to the Romans, who used it for Latin. The alphabet spread with Western civilisation and eventually most nations of the world were exposed to, and had the option of using, alphabetic writing.

According to one view, the alphabet was not invented, it was discovered. If language did not include discrete individual sounds, no one could have invented alphabetic letters to represent such sounds. When humans started to use one symbol for one phoneme, they merely brought their intuitive knowledge of the language sound system to consciousness: they discovered what they already knew. Furthermore, children (and adults) can learn an alphabetic system only if each separate sound has some psychological reality.

Modern writing systems

> [B]ut their manner of writing is very peculiar, being neither from the left to the right, like the Europeans; nor from the right to the left, like the Arabians; nor from up to down, like the Chinese; nor from down to up, like the Cascagians, but aslant from one corner of the paper to the other, like ladies in England.
>
> Jonathan Swift, *Gulliver's Travels*, 1726

We have already mentioned the various types of writing systems used in the world: word or logographic writing, syllabic writing, consonantal alphabet writing and alphabetic writing. Most of the world's written languages use alphabetic writing. Even Chinese and Japanese, whose native writing systems are not alphabetic, have adopted alphabetic transcription systems for special purposes, such as communicating with foreigners, on computers and over the internet.

Word writing

In a word-writing, or logographic-writing, system, a written character represents the meaning and the pronunciation of each word or morpheme. The awkwardness of such a system is obvious. The *Oxford English Dictionary*, for example, lists more than 600 000 entries. All of these words are written using a combination of only 26 alphabetic symbols, a dot, a hyphen, an apostrophe and a space. It is understandable why, historically, word writing gave way to alphabetic systems in most places in the world.

The major exceptions are the writing systems used in China and Japan. The Chinese writing system has an uninterrupted history that goes back more than 3500 years. For the most part it is a word-writing system, each **character** representing an individual word or morpheme. Longer words may be formed by combining two words or morphemes, as shown by the word meaning 'business', *mǎimai*, which is formed by combining the words meaning *buy* and *sell*. This is similar to compounding in English.

characters (Chinese)
The units of Chinese writing, each of which represents a morpheme or word.

A word-writing system would be awkward for English and other Indo-European languages because of the pervasiveness of inflectional morphemes, such as the *in-*, *im-* and /ɪŋ/- of *intolerant*, *impossible* and *incontinent*; inflected verb forms, such as *take*, *takes*, *taken*, *took* and *taking*; and inflected noun forms, such as *cat*, *cats* and *cat's*. These are difficult to represent without a huge proliferation of characters. Chinese, on the other hand, has little inflection.

Even without the need to represent inflectional forms, Chinese dictionaries contain tens of thousands of characters; although a person need only know about 5000 to read a newspaper. To promote literacy, the Chinese government undertakes character simplification programs from time to time. This process was first tried in 213 BCE, when the scholar Li Si published an official list of more than 3000 characters whose written forms he had simplified by omitting unneeded strokes. This would be analogous to dictionary writers simplifying *amoeba* to *ameba*, eliminating the superfluous *o*.

Since that time, successive generations of Chinese scholars have added new characters and modified old ones, creating redundancy, ambiguity and complexity. Recent character-simplification efforts continue the ages-old tradition of trying to make the system learnable and usable while retaining its basic form.

The Chinese government has adopted a spelling system using the Roman alphabet called **Pinyin**, which is now used for certain purposes along with the regular system of characters. Many city street signs are printed in both systems, which is helpful to foreign visitors. It is not the government's intention to replace the traditional writing, which is viewed as an integral part of Chinese culture. To the Chinese, writing is an art – **calligraphy** – and thousands of years of poetry, literature and history are preserved in the old system.

Pinyin
An **alphabetic writing** system for Mandarin Chinese using a Western-style alphabet to represent individual sounds.

calligraphy
The art of writing or drawing Chinese characters.

An additional reason for keeping the traditional system is that it permits all literate Chinese to communicate even though their spoken languages are not mutually intelligible. Therefore, writing has served as a unifying factor throughout Chinese history, in an area where hundreds of languages and dialects coexist. A Chinese proverb states: 'people separated by a blade of grass cannot understand each other'. The unified writing system is a scythe that cuts across linguistic differences and allows the people to communicate.

This use of written Chinese characters is similar to the use of Arabic numerals, which mean the same in many countries. The character *5*, for example, stands for a different sequence of sounds in English, French and Finnish. In English it is *five* [fɑev] in French it is *cinq* [sæ̃k] and in Finnish *viisi* [ʋiːsi] but in all these languages, *5*, whatever its phonological form, means ‘five’. Similarly, the spoken word for ‘rice’ is different in the various Chinese languages, but the written character is the same. If the writing system in China were to become alphabetic, each language would be as different in writing as in speaking, and written communication would no longer be possible among the various language communities.

Syllabic writing

Syllabic writing systems are more efficient than word-writing systems and they are certainly less taxing on the memory. However, languages with a rich structure of syllables containing many consonant clusters (e.g. *tr* or *spl*) cannot be efficiently written with a syllabary. To see this difficulty, consider the syllable structures of English:

ear	/ɪə/	V	ant	/ænt/	VCC
key	/kiː/	CV	pant	/pænt/	CVCC
ski	/skiː/	CCV	stamp	/stæmp/	CCVCC
spree	/spɹiː/	CCCV	stripped	/strɪpt/	CCCVCC
an	/æn/	VC	ants	/ænts/	VCCC
seek	/siːk/	CVC	pants	/pænts/	CVCCC
speak	/spiːk/	CCVC	splints	/splɪnts/	CCCVCCC
scram	/skɹæm/	CCCVC			

With more than 30 consonants and more than 12 vowels, the number of different possible syllables is astronomical, which is why English, and Indo-European languages in general, are unsuitable for syllabic writing systems.

The Japanese language, on the other hand, is more suited for syllabic writing, because all words in Japanese can be phonologically represented by about 100 syllables, mostly of the consonant–vowel (CV) type, and there are no underlying consonant clusters. To write these syllables, the Japanese have two syllabaries, each containing 46 characters, called **kana**. The entire Japanese language can be written using kana. One syllabary, **katakana**, is used for loan words and for special effects similar to italics in European writing. The other syllabary, **hiragana**, is used for native words. Hiragana characters may occur in the same word as ideographic characters, which are called **kanji** and are borrowed Chinese characters. Therefore, Japanese writing is part word writing, part syllable writing.

During the first millennium, the Japanese tried to use Chinese characters to write their language. However, spoken Japanese is unlike spoken Chinese. (They are genetically unrelated languages.) A word-writing system alone was not suitable for Japanese, which is a highly inflected language in which verbs may occur in 30 or more different forms. Scholars devised syllabic characters, based on modified Chinese characters, to represent the inflectional endings and other grammatical morphemes. Therefore, in Japanese writing, kanji is commonly used for the verb roots and hiragana symbols for the inflectional markings.

For example, 行 is the character meaning ‘go’, pronounced [i]. The word for ‘went’ in formal speech is *ikimashita*, written 行きました, where the hiragana symbols き ま し た represent the syllables *ki*, *ma*, *shi*, *ta*. Nouns, on the other hand, are not inflected in Japanese and they can generally be written using Chinese characters alone.

kana
The characters of either of the two Japanese **syllabaries**, **katakana** and **hiragana**.

katakana
A Japanese **syllabary** generally used for writing **loan words** and to achieve the effect of italics.

hiragana
A Japanese **syllabary** used to write native words of the language, most often together with ideographic characters.

kanji
The Japanese term for the Chinese characters used in Japanese writing.

In theory, all of Japanese could be written in hiragana. However, in Japanese there are many homographs (like *lead* in *lead pipe* or *lead astray*), and the use of kanji disambiguates a word that might be ambiguous if written syllabically, similar to the ambiguity of *can* in *He saw that gasoline can explode*. In addition, kanji writing is an integral part of Japanese culture and it is unlikely to be abandoned.

In 1821, Sequoyah (often called the Cherokee Cadmus), a Native American, invented a syllabic writing system for his native language, Cherokee. Sequoyah's script, which survives today essentially unchanged, proved useful to the Cherokee people and is justifiably a point of great pride for them. The syllabary contains 85 symbols, many of them derived from Latin characters, which efficiently transcribe spoken Cherokee. A few symbols are shown here:

Ꭻ	gu
Ꮀ	hu
Ꮻ	we
Ꮤ	ta
Ꮇ	mi

In some languages, an alphabetic character can be used in certain words to write a syllable. In a word such as *BBQ*, the single letters represent syllables (*b* for [bʉː], *b* for [bə], *q* for [kjʉː]).

Consonantal alphabet writing

Semitic languages, such as Hebrew and Arabic, are written with alphabets that consist only of consonants (**consonantal alphabet writing**). Such an alphabet works for these languages because consonants form the root of most words. For example, the consonants *ktb* in Arabic form the root of words associated with *write*. Therefore *katab* means 'to write', *aktib* means 'I write', *kitab* means 'a book' and so on. Inflectional and derivational processes can be expressed by different vowels inserted into the triconsonantal roots.

consonantal alphabet writing
A writing system of symbols that represent only **consonants**; **vowels** are inferred from context, e.g. Arabic.

Because of this structure, vowels can sometimes be figured out by a person who knows the spoken language, jst lk y cn rd ths phrs, prvdng y knw nglsh. English, however, is unrelated to the Semitic languages, and its structure is such that vowels are usually crucial for reading and writing: the English phrase *I like to eat out* would be incomprehensible without vowels: *lk t t t*.

Semitic alphabets provide a way to use diacritic marks to express vowels. This is partly out of the desire to preserve the true pronunciations of religious writings, and partly out of deference to children and foreigners learning to read and write. In Hebrew, dots or other small figures are placed under, above or in the centre of the consonantal letter to indicate the accompanying vowel. ל, for example, represents an *l*-sound in Hebrew writing. Unadorned, the vowel that follows would be determined by context. ◌ֶ (with a tiny triangle of dots below it) indicates that the vowel that follows is [e], so in effect לֶ represents the syllable [le].

These systems are called consonantal alphabets because only the consonants are fully developed symbols. Sometimes they are considered syllabaries because once the reader or writer perceives the vowel, the consonantal letter seems to stand for a syllable. With a true syllabary, a person need only know the phonetic value of each symbol to pronounce it correctly and unambiguously. Once you learn a Japanese syllabary, you can read Japanese in a (more or less) phonetically correct way without any idea of what you are saying. (The syllabic text does not always show word boundaries and there is no indication of prosodic features such as intonation.) Anyway, this would be impossible for Arabic or Hebrew.

Alphabetic writing

Alphabetic writing systems are easy to learn, convenient to use and maximally efficient for transcribing any human language.

The term **sound writing** is sometimes used in place of *alphabetic writing*, but it does not truly represent the principle involved in the use of alphabets. Using one letter to represent one sound is inefficient, because we do not need to represent the [p^h] in *pit* and the [p] in *spit* by two different letters. It is confusing to represent non-phonemic differences in writing because the differences are seldom perceptible to speakers. Except for the phonetic alphabets, whose function is to record the sounds of all languages for descriptive purposes, most, if not all, alphabets have been devised on the **phonemic principle**.

sound writing
A term sometimes used to mean a writing system in which one sound is represented by one letter. Sound writing systems do not employ the **phonemic principle** and are similar to phonetic transcriptions.

phonemic principle
The principle that underlies alphabetic writing systems, in which one symbol typically represents one **phoneme**.

In the twelfth century, an Icelandic scholar developed an orthography derived from the Latin alphabet for the writing of the Icelandic language of his day. Other scholars in this period were also interested in orthographic reform, but the Icelander, who came to be known as 'the First Grammarian' (because his anonymous paper was the first entry in a collection of grammatical essays), was the only one of the time who left a record of his principles. The orthography he developed was clearly based on the phonemic principle. He used minimal pairs to show the distinctive contrasts. He did not suggest different symbols for voiced and unvoiced [θ] and [ð], or for [f] and [v] or for velar [k] and palatal [tʃ], because these pairs, according to him, represented allophones of the phonemes /θ/, /f/ and /k/ respectively. He did not use these modern technical terms, but the letters of this alphabet represent the distinctive phonemes of Icelandic of that century.

King Seijong of Korea (1397–1450) realised that the same principles held true for Korean when, with the assistance of scholars, he designed a phonemic alphabet. The king was an avid reader and realised that the more than 30 000 Chinese characters used to write Korean discouraged literacy. The fruit of the king's labour was the Korean alphabet called **Hangul**, which had 17 consonants and 11 vowels.

Hangul
An alphabet for writing the Korean language based on the phonemic principle, designed in the fifteenth century.

The Hangul alphabet was designed on the phonemic principle. Although Korean has both *l* and *r* sounds, Seijong represented them by a single letter because they are allophonic variants of the same phoneme (see exercise 3, Chapter 3). The same is true for the sounds [s] and [ʃ], and [ts] and [ʧ].

Seijong showed further ingenuity in the design of the characters themselves. The consonants are drawn so as to depict the place and manner of articulation. Therefore the letter for /g/ is ¬ to suggest the raising of the back of the tongue to the velum. The letter for /m/ is £, the closed figure to suggest the closing of the lips. Vowels are drawn as long vertical or horizontal lines, sometimes with smaller marks attached to them. Therefore | represents /i/, ⊤ represents /u/ and ⊢ represents /a/. They are easily distinguishable from the blockier consonants.

In Korean writing, the Hangul characters are grouped into squarish blocks, each corresponding to a syllable. The syllabic blocks, though they consist of alphabetic characters, make Korean look as if it were written in a syllabary. If English were written that way, *Now is the winter of our discontent* would have this appearance:

No	i	th	wi	te	o	ou	di	co	te
w	s	e	n	r	f	r	s	n	nt

The space between letters is less than the space between syllables, which is less than the space between words. An example of Korean writing can be found in exercise 9, item x at the end of this chapter, or on the internet (visit http://thinkzone.wlonk.com/Language/Korean.htm).

These characteristics make Korean writing unique in the world, unlike that of the Europeans, the Arabians, the Chinese, the Cascagians or even 'ladies in England'.

Many languages have their own alphabet, and each has developed certain conventions for converting strings of alphabetic characters into sequences of sounds (reading) and converting sequences of sounds into strings of alphabetic characters (writing). As we have illustrated with English, Icelandic and Korean, the rules governing the sound system of the language play an important role in the relation between sound and character.

Most European alphabets use Latin (Roman) letters, adding diacritic marks to accommodate individual characteristics of a particular language. Spanish, for example, uses *n* to represent the palatalised nasal phoneme of *señor* and German has added an umlaut for certain of its vowel sounds that did not exist in Latin (e.g. in *über*). Diacritic marks supplement the 46 kana of the Japanese syllabaries to enable them to represent the more than 100 syllables of the language. Diacritic marks are also used in writing systems of tone languages, such as Thai, to indicate the tone of a syllable.

digraph

Two letters used to represent a single sound, e.g. *gh* represents [f] in *enough*.

Some languages use two letters together – called a **digraph** – to represent a single sound. English has many digraphs, such as *sh* /ʃ/ as in *she*, *ch* /ʧ/ as in *chop*, *ng* /ŋ/ as in *sing* and *ea* /iː/ as in *leaf*.

Besides the European languages, languages such as Turkish, Indonesian, Swahili and Vietnamese have adopted the Latin alphabet. Other languages that have more recently developed a writing system use some of the IPA phonetic symbols in their alphabet. Twi, for example, uses ɔ, e and ŋ.

Many Slavic languages, including Russian, use the Cyrillic alphabet, named for St Cyril. It is derived directly from the Greek alphabet without Latin mediation.

Many contemporary alphabets, such as those used for Arabic, Farsi (spoken in Iran), Urdu (spoken in Pakistan) and many languages of the Indian subcontinent, including Hindi, are ultimately derived from the ancient Semitic syllabaries.

Table 11.1 shows a coarse timeline of the development of the Roman alphabet.

Table 11.1 Timeline of the development of the Roman alphabet

15 000 BCE	Cave drawings as pictograms
4000 BCE	Sumerian cuneiform
3000 BCE	Hieroglyphics
1500 BCE	West Semitic Syllabary of the Phoenicians
1000 BCE	Ancient Greeks borrow the Phoenician consonantal alphabet
750 BCE	Etruscans borrow the Greek alphabet
500 BCE	Romans adapt the Etruscan/Graeco alphabet to Latin

Writing and speech

> *Algernon*: But, my own sweet Cecily, I have never written you any letters.
> *Cecily*: You need hardly remind me of that, Ernest. I remember only too well that I was forced to write your letters for you. I wrote always three times a week, and sometimes oftener.
> *Algernon*: Oh, do let me read them, Cecily?
> *Cecily*: Oh, I couldn't possibly. They would make you far too conceited. The three you wrote me after I had broken off the engagement are so beautiful, and so badly spelled, that even now I can hardly read them without crying a little.
>
> Oscar Wilde, *The Importance of Being Earnest*, 1895

The development of writing freed us from the limitations of time and geography, but spoken language still has primacy and is the principal concern of most linguists. Nevertheless, writing systems are of interest for their own sake.

The written language reflects, to a certain extent, the elements and rules that together constitute the grammar of the language. The letters of the alphabet represent the system of phonemes, although not necessarily in a direct way. The independence of words is revealed by the spaces between them in most writing systems. Written Japanese and Thai do not require spaces between words, although speakers and writers are aware of the individual words. On the other hand, no writing system shows the individual morphemes within a word in this way, even though speakers know what they are (the hyphen occasionally serves this purpose in English, as in *two-fold* or *bone-dry*).

Languages vary in regard to how much punctuation is used in writing. Some, such as Chinese, have little or none. German uses capitalisation, a form of punctuation, for all nouns. English uses punctuation to set apart sentences and phrases, and to indicate questions, intonation, stress and contrast.

Consider the difference in meaning between (1) and (2):

1 Jack, thinks Jill, is smart.

2 Jack thinks Jill is smart.

With commas, as in (1), it is Jack who is thought to be smart. Without commas, as in (2), it is Jill who is thought to be smart. These commas fill in for the pauses of speech that would have made the meaning clear.

Similarly, by using an exclamation point or a question mark, the intention of the writer can be made clearer.

3 The children are going to bed at eight o'clock. (a simple statement)

4 The children are going to bed at eight o'clock! (an order)

5 The children are going to bed at eight o'clock? (a question)

In sentences (6) and (7), the use of the comma and quotation marks affects the syntax. In (6) *he* may refer to either John or to someone else, but in (7) the pronoun must refer to someone other than John:

6 John said he's going.

7 John said, 'He's going.'

The apostrophe used in contractions and possessives also provides syntactic information not always available in the spoken utterance:

8 My cousin's friends (one cousin)

9 My cousins' friends (two or more cousins)

Writing, then, somewhat reflects the spoken language and punctuation may even distinguish between two meanings not revealed in the spoken forms, as shown in sentences (8) and (9). However, often the spoken language conveys meaning that the written language does not.

In the written version of sentence (10):

10 John whispered the message to Bill and then he whispered it to Mary.

he can refer to either John or Bill. In the spoken sentence, if *he* receives extra stress (called **contrastive stress**), it must refer to Bill; if *he* receives normal stress, it refers to John.

contrastive stress
Additional stress placed on a word to highlight it or to clarify the referent of a pronoun.

A speaker can usually emphasise any word in a sentence by using contrastive stress. Writers sometimes attempt to show emphasis by using all capital letters or italics, or underlining the emphasised word:

11 *John* kissed Bill's wife. (Bill didn't)

12 John *kissed* Bill's wife. (rather than hugging her)

13 John kissed *Bill's* wife. (not Dick's or his own)

14 John kissed Bill's *wife*. (not Bill's mother)

Although such visual devices can help in English, it is not clear that they can be used in a language such as Chinese. In Japanese, however, this kind of emphasis can be achieved by writing a word in katakana.

The use of italics has many functions in written language. One use is to indicate reference to the italicised word itself, as in '*sheep* is a noun article'. A children's riddle, which is sung aloud, plays on this distinction:

Railroad crossing, watch out for cars

How do you spell it without any *r*s?

The answer is 'i-t'. The joke is that the second line, were it written, would be:

How do you spell *it* without any *r*s?

Written language is more conservative than spoken language, which is why the English spelling system is replete with vestiges left over from the Great Vowel Shift discussed in Chapter 10. When we write we are more apt, than when we speak, to obey the prescriptive rules taught in school. We may write *it is I* but we say, 'it's me'. Such informalities abound in spoken language, but may be 'corrected' by copyeditors, diligent English teachers and careful writers. A linguist wishing to describe the language that people regularly use therefore cannot depend on written records alone, except when nothing else is available, as in the study of dead languages (see Chapter 10).

Spelling

> 'Do you spell it with a "v" or a "w"?' inquired the judge.
> 'That depends upon the taste and fancy of the speller, my Lord,' replied Sam.
>
> Charles Dickens, *The Pickwick Papers*, 1837

If writing represented the spoken language perfectly, spelling reforms would never have arisen. In Chapter 2 we discussed some of the problems in the English orthographic system. These problems prompted George Bernard Shaw to write:

> It was as a reading and writing animal that Man achieved his human eminence above those who are called beasts. Well, it is I and my like who have to do the writing. I have done it professionally for the last sixty years as well as it can be done with a hopelessly inadequate alphabet devised centuries before the English language existed to record another and very different language. Even this alphabet is reduced to absurdity by a foolish orthography based on the notion that the business of spelling is to represent the origin and history of a word instead of its sound and meaning. Thus an intelligent child who is bidden to spell *debt*, and very properly spells it *d-e-t*, is caned for not spelling it with a *b* because Julius Caesar spelt the Latin word for it with a *b*.[5]

graphemes
The symbols of an **alphabetic writing** system; the letters of an alphabet.

The irregularities between **graphemes** (letters) and phonemes have been cited as one reason 'why Johnny can't read'. Homographs, such as *lead* /liːd/ and *lead* /led/, have fuelled the flames of spelling reform movements. Different spellings for the same sound, silent letters and missing letters also are cited as reasons that English needs a new orthographic system. The following examples illustrate the discrepancies between spelling and sounds in English:

Same sound, different spelling	Different sound, same spelling	Silent letters	Missing letters
/ɑe/ /aɪ/	thought /θ/	listen	use /jʉ:z/ /juz/
aye	though /ð/	debt	fuse /fjʉ:z/ /fjuz/
buy	Thomas /t/	gnome	
by		know	
die	ate /æɪ/ /eɪ/	psychology	
hi	at /æ/	right	
Thai	father /ɐ:/ /a/	mnemonic	
height	many /e/ /ɛ/	science	
guide		talk	
		honest	
		sword	
		bomb	
		clue	
		Wednesday	

The spelling of most English words today is based on English as spoken in the fourteenth, fifteenth and sixteenth centuries. Spellers in those times saw no need to spell the same word consistently. Shakespeare spelt his own name in several ways. In his plays, he spelt the first-person singular pronoun variously as *I*, *ay* and *aye*.

When the printing press was introduced in the fifteenth century, archaic and idiosyncratic spellings became widespread and more permanent. Words in print were frequently misspelt outright because many of the early printers were not native speakers of English.

Spelling reformers saw the need for consistent spelling that correctly reflected the pronunciation of words. To that extent spelling reform was necessary, but many scholars became overzealous. Because of their reverence for Classical Greek and Latin, these scholars changed the spelling of English words to conform to their etymologies. Where Latin had a *b*, they added a *b* even if it was not pronounced. Where the original spelling had a *c* or *p* or *h*, these letters were added, as shown by these few examples:

Middle English spelling		Reformed spelling
indite	→	indict
dette	→	debt
receit	→	receipt
oure	→	hour

Such spelling habits inspired Robert N Feinstein to compose the following poem, entitled 'Gnormal pspelling':[6]

> Gnus and gnomes and gnats and such –
> Gnouns with just one G too much.
> Pseudonym and psychedelic –
> P becomes a psurplus relic.
> Knit and knack and knife and knocked –
> Kneedless Ks are overstocked.
> Rhubarb, rhetoric and rhyme
> Should lose an H from thyme to time.

Even today spelling reform is an issue. Advertisers often spell *though* as *tho*, *through* as *thru* and *night* as *nite*. The *Chicago Tribune* once used such spellings, but it gave up the practice in 1975. Spelling habits are hard to change and many people regard revised spelling as substandard.

The current English spelling system is based primarily on the earlier pronunciations of words. The many changes that have occurred in the sound system of English since then are not reflected in the current spelling, which was frozen due to widespread printed material and scholastic conservatism.

For these reasons, modern English orthography does not always represent what we know about the phonology of the language. The disadvantage is partially offset by the fact that the writing system allows us to read and understand what people wrote hundreds of years ago without the need for translations. If there were a one-to-one correspondence between our spelling and the sounds of our language, we would have difficulty reading something written as recently as Captain Cook's journals, let alone Shakespeare.

Languages change. It is not possible to maintain a perfect correspondence between pronunciation and spelling, nor is it 100 per cent desirable. In the case of homophones, for instance, it is helpful at times to have different spellings for the same sounds, as in the following pair:

The book was red. The book was read.

Lewis Carroll makes the point with humour:

> 'And how many hours a day did you do lessons?' said Alice. 'Ten hours the first day,' said the Mock Turtle, 'nine the next, and so on.' 'What a curious plan!' exclaimed Alice. 'That's the reason they're called lessons,' the Gryphon remarked, 'because they lessen from day to day.'

There are also reasons for using the same spelling for different pronunciations. A morpheme may be pronounced differently when it occurs in different contexts. The identical spelling reflects the fact that the different pronunciations represent the same morpheme. This is the case with the plural morpheme. It is always spelt with an *s*, despite being pronounced [s] in *cats* and [z] in *dogs*. The sound of the morpheme is determined by rules, in this case and elsewhere.

Similarly, the phonetic realisations of the vowels in the following forms follow a regular pattern:

/ɑe/ /aɪ/ – /ɪ/	/iː/ /i/ – /e/ /ɛ/	/æɪ/ /eɪ/ – /æ/
divine/divinity	serene/serenity	sane/sanity
sublime/sublimate	obscene/obscenity	profane/profanity
sign/signature	clean/cleanse	humane/humanity

morphophonemic orthography
A writing system, such as that for English, in which morphological knowledge is needed to read correctly, e.g. in *please/pleasant* the *ea* represents [iː]/[e].

These considerations have led some scholars to suggest that in addition to being phonemic, English has a **morphophonemic orthography**. To read English correctly, morphophonemic knowledge is required. This contrasts with a language such as Spanish, whose orthography is almost purely phonemic.

Other examples provide further motivation for spelling irregularities. The *b* in *debt* may remind us of the related word *debit*, in which the *b* is pronounced. The same principle is true of sets such as *sign/signal*, *bomb/bombardier* and *gnosis/prognosis/agnostic*.

There are also different spellings that represent the different pronunciations of a morpheme when confusion would arise from using the same spelling. There is, for example, a rule in English phonology that changes a /t/ to an /s/ in certain cases:

democrat → democracy

The different spellings have resulted partly because this rule does not apply to all morphemes, so that *art* + *y* is *arty*, not **arcy*. Regular phoneme-to-grapheme rules determine in many cases when a morpheme is to be spelt identically and when it is to be changed.

Other subregularities are apparent. A *c* always represents the /s/ sound when it is followed by a *y*, *i* or *e*, as in *cynic*, *citizen* and *censure*. Because it is always pronounced [k] when it is the final letter in a word or when it is followed by any other vowel (*coat*, *cat*, *cut* and so on), no confusion results. The *th* spelling is usually pronounced voiced [ð] between vowels (the result of a historical intervocalic voicing rule) and in function words such as *the*, *they*, *this* and *there*. Elsewhere it is the voiceless [θ].

There is another important reason that spelling should not always be tied to the phonetic pronunciation of words. Different dialects of English have divergent pronunciations. Cockneys often drop their (h) *aitches* and Americans generally pronounce their *r*s; *neither* is pronounced [niðəɹ], [naɪðəɹ] and [nɪðə] by Americans; [naɪðə] by the British and [neɪðəɹ] by the Irish; some Scots pronounce *night* [nɪxt]; people say 'cahstle' and 'casstle', 'creek' and 'crick', 'baysic' and 'bassic'; and *four* is pronounced [foː] by Australians, [fɔr] and [fɔə] by Americans.

While dialectal pronunciations differ, the common spellings indicate the intended word. It is necessary for the written language to transcend local dialects. With a uniform spelling system, a native of Atlanta and a native of Glasgow can communicate through writing. If each dialect were spelt according to its pronunciation, written communication among the English-speaking peoples of the world would suffer.

Spelling pronunciations

> For pronunciation, the best general rule is to consider those as the most elegant speakers who deviate least from written words.
>
> Samuel Johnson (1707–1784)

Despite the primacy of the spoken word over the written language, the written word is often regarded with excessive reverence. The stability, permanence and graphic nature of writing cause some people to favour it over ephemeral and elusive speech. Humpty Dumpty expressed a rather typical attitude when he said: 'I'd rather see that done on paper'.

Writing has affected speech only marginally, most notably in the phenomenon of **spelling pronunciation**. Since the sixteenth century, we find that spelling has to some extent influenced standard pronunciation. The most important of such changes stem from the eighteenth century under the influence and decrees of the dictionary makers and the schoolteachers. The struggle between those who demanded that words be pronounced according to the spelling and those who demanded that words be spelt according to their pronunciation generated great heat in that century. The preferred pronunciations were given in the many dictionaries printed in the eighteenth century and the supreme authority of these dictionaries influenced pronunciation.

spelling pronunciation
Pronouncing a word as it is spelt, irrespective of its actual pronunciation by native speakers, e.g. pronouncing *Wednesday* as 'wed-ness-day'.

Spelling has also influenced pronunciation of words that are infrequently used in normal daily speech. In many words that were spelt with an initial *h*, the *h* was silent as recently as the eighteenth century. Then, no [h] was pronounced in *honest*, *hour*, *habit*, *heretic*, *hotel*, *hospital* and *herb*. Common words, such as *honest* and *hour*, continued *h*-less, despite the spelling. The other, less frequently used words were given a spelling pronunciation and the *h* is sounded today.

Similarly, the *th* in the spelling of many words was once pronounced like the /t/ in *Thomas*. Later, most of these words underwent a change in pronunciation from /t/ to /θ/, as in *anthem*, *author* and *theatre*. Nicknames may reflect the earlier pronunciations: 'Kate' for 'Ca*th*erine', 'Be*tt*y' for 'Elizabe*th*', 'Art' for 'Ar*th*ur'. *Often* is often pronounced with the *t* sounded, although historically it is silent, and up-to-date dictionaries now indicate this pronunciation as an alternative.

The clear influence of spelling on pronunciation is observable in the way place names are pronounced. *Berkeley* is pronounced [bərkli] in California, although it stems from the British [bɐːkli]; *Worcester* [wʊstə] in England is often pronounced [wʊɹʧestəɹ] in the US. Similarly, Derby in Western Australia is [dɜːbiː] rather than [dɐːbi].

Although the written language has some influence on the spoken, it does not change the basic system – the grammar – of the language. The writing system, conversely, reflects, in a more or less direct way, the grammar that every speaker knows.

CHAPTER REVIEW

Summary

Writing is a basic tool of civilisation. Without it, the world as we know it could not exist.

The precursor of writing was picture writing, which used pictograms to represent objects directly and literally. Pictograms are called ideograms when the drawing becomes less literal and the meaning extends to concepts associated with the object originally pictured. When ideograms become associated with the words for the concepts they signify, they are called logograms. Logographic systems are true writing systems in the sense that the symbols stand for words of a language.

The Sumerians first developed a pictographic writing system to keep track of commercial transactions. It was later expanded for other uses and eventually evolved into the highly stylised (and stylus-ised) cuneiform writing. Cuneiform was generalised to other writing systems by application of the rebus principle, which uses the symbol of one word or syllable to represent another word or syllable with the same pronunciation.

The Egyptians also developed a pictographic system known as hieroglyphics. This system influenced many peoples, including the Phoenicians, who developed the West Semitic Syllabary. The Greeks borrowed the Phoenician system and, in adapting it to their own language, they used the symbols to represent both consonant and vowel sound segments, thereby inventing the first alphabet.

There are broadly four types of writing systems: logographic (word writing), in which every symbol or character represents a word or morpheme (as in Chinese); syllabic, in which each symbol represents a syllable (as in Japanese); consonantal alphabetic, in which each symbol represents a consonant and vowels may be represented by diacritical marks (as in Hebrew); and alphabetic, in which each symbol represents (for the most part) a vowel or consonant (as in English).

The writing system may have some small effect on the spoken language. Languages change in time, but writing systems tend to be more conservative. Therefore spelling no longer accurately reflects pronunciation. Also, when the spoken and written forms of the language diverge, some words may be pronounced as they are spelt, sometimes as a result of the efforts of pronunciation reformers.

There are advantages to a conservative spelling system. A common spelling permits speakers whose dialects have diverged to communicate through writing, as is best exemplified in China, where the languages are mutually unintelligible. We are also able to read and understand the language as it was written centuries ago. In addition, despite a certain lack of correspondence between sound and spelling, the spelling often reflects speakers' morphological and phonological knowledge.

Exercises

1 a 'Write' the following words and phrases, using pictograms that you invent:
   - **i** eye
   - **ii** a boy
   - **iii** two boys
   - **iv** library
   - **v** tree
   - **vi** forest
   - **vii** war
   - **viii** honesty
   - **ix** ugly
   - **x** run
   - **xi** sticky tape
   - **xii** smoke.

  b Which words are most difficult to symbolise in this way? Why?

  c How does the following sentence reveal the problems in pictographic writing? 'A grammar represents the unconscious, internalised linguistic competence of a native speaker.'

2 A *rebus* is a written representation of words or syllables that uses pictures of objects whose names resemble the sounds of the intended words or syllables. , for example, might be the symbol for *eye* or *I* or the first syllable in *idea*.

- **a** Using the rebus principle, write the following words:
  - **i** tearing
  - **ii** icicle
  - **iii** bareback
  - **iv** mosquito.
- **b** Why would such a system be a difficult system in which to represent all words in English? Illustrate with an example.

3 **a** Construct non-Roman alphabetic letters to replace the letters used to represent the following sounds in English.
t ɹ s k w ʧ iː æ f n

- **b** Use these symbols plus the regular alphabet symbols for the other sounds to write the following words in your new orthography:
  - **i** character
  - **ii** guest
  - **iii** cough
  - **iv** photo
  - **v** cheat
  - **vi** rang
  - **vii** psychotic
  - **viii** tree.

4 Suppose the English writing system were a *syllabic* system instead of an *alphabetic* system. Use capital letters to symbolise the necessary *syllabic* units for the following words and list your syllabary. Given the words *mate*, *inmate*, *intake* and *elfin*, for example, you might use A = mate, B = in, C = take, D = elf. In addition, write the words using your syllabary (do not use more syllable symbols than you absolutely need).
Example: *inmate* – BA; *elfin* – DB; *intake* – BC; *mate* – A

- **a** childishness
- **b** childlike
- **c** Jesuit
- **d** lifelessness
- **e** likely
- **f** zoo
- **g** witness
- **h** lethal
- **i** jealous
- **j** witless
- **k** lesson.

5 In the following pairs of English words, the bold-faced portions are pronounced the same but spelt differently. Can you think of any reason why the spelling should remain distinct? (*Hint*: *Reel* and *real* are pronounced the same, but *reality* shows the presence of a phonemic /æ/ in *real*.)

a	I **am**	ia**mb**
b	goo**s**e	produ**c**e
c	fa**sh**ion	complica**t**ion
d	Newt**on**	org**an**
e	**n**o	**kn**ow
f	hy**mn**	hi**m**

6 In the following pairs of words, the bold-faced portions are spelt the same but pronounced differently. Try to state some reasons why the spelling of the words in column B should not be changed.

	A	B	Reason
a	min**g**le	lon**g**	The *g* is pronounced in *longer*.
b	l**i**ne	ch**i**ldren	
c	**s**onar	re**s**ound	
d	**c**ent	misti**c**	
e	crum**b**le	bom**b**	
f	cat**s**	dog**s**	
g	sta**gn**ant	desi**gn**	
h	ser**e**ne	obsc**e**nity	

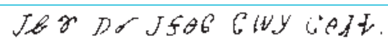
7 Each of the following sentences is ambiguous in the written form. How can these sentences be made unambiguous when they are spoken?
Example: John hugged Bill and then he kissed him.
For the meaning 'John *hugged* and kissed Bill', use normal stress (*kissed* receives stress). For the meaning 'Bill kissed John', contrastive stress is needed on both *he* and *him*.

a What are we having for dinner, Mother?
b She's a German language teacher.
c They formed a student grievance committee.
d Charles kissed his wife and George kissed his wife too.

8 In the written form, the following sentences are not ambiguous, but they would be if spoken. State the devices used in writing that make the meanings explicit.

a They're my brothers' keepers.
b He said, 'He will take out the garbage'.
c The red book was read.
d The flower was on the table.

9 Match the 10 samples of writing and the 10 languages. There are enough hints in this chapter to get most of them.[7]

a	Cherokee	i	仮に勝手に変えるようなことをすれば,
b	Chinese	ii	Κι ὁ νοῦς του ἀγκάλιασε ποντικὰ τὴν Κρήτη.
c	German (Gothic style)	iii	«Что это? я падаю? у меня ноги подкашиваются»,
d	Greek	iv	וְהָיָה ׀ בְּאַחֲרִית הַיָּמִים נָכוֹן יִהְיֶה הַר
e	Hebrew	v	Saá sáre yi bɛŋ atɛkyɛ́ bí à mpɔ̀torɔ áhyɛ́
f	Icelandic	vi	既然必须和新的群众的时代相结合.
g	Japanese	vii	
h	Korean	viii	Þótt þú langförull legðir sérhvert land undir fót,
i	Russian	ix	Pharao's Anblick war wunderbar.
j	Twi	x	스위스는 독특한 체제

10 The following appeared on the safety card of a Spanish airline. Identify each language. (You will probably have to spend some time in the library and/or visit various departments of foreign languages.)

a Para su seguridad
b For your safety
c Pour votre sécurité
d Für ihre Sicherheit
e Per la vostra sicurezza

f Para sua segurança

g の安全のために

h ашей безогiасности

i Dla bezpieczeństwa pasażerów

j Za vašu

k Γιά τήν ἀσφάλειά σας

l Kendi emniyetiniz icin

m من اجل سلامتك

11 Diderot and D'Alembert, the French encyclopaedists, wrote:

> The Chinese have no alphabet; their very language is incompatible with one, since it is made up of an extremely limited number of sounds. It would be impossible to convey the sound of Chinese through our alphabet or any other alphabet.

Comment on this.

12 Briefly discuss the arguments for and against the use of the 'serial comma' (also known as 'Oxford comma' and 'Harvard comma').

13 Briefly discuss the difference between a consonantal writing system and a syllabic system. What type of writing system is represented by a personalised registration plate, such as PRFSR (to mean 'professor')?

14 Here are several emoticons. See if you can assign a meaning to each one. There is no one correct answer because they have not been in the language long enough to become conventionalised. One set of possible answers is printed in the endnote.[8]

- **a** >>:–(
- **b** :–#
- **c** 8:--(
- **d** :D
- **e** :-(o)
- **f** : — (O)
- **g** | —)
- **h** :/)

15 Make up five or ten emoticons along with their meanings. Don't just look them up somewhere. Be creative, for example, **3:>>8** to mean 'bull!'

16 The use of emoji in text messages and other forms of electronic communication has increased dramatically in the past few years. Some people are concerned that this excessive use of emoji may cause the death of English. What is your opinion on this? Discuss briefly. As a starting point, consult McCulloch (2019), referenced in the 'Further Reading' section of this chapter.

17 Punctuate the following with full stops, commas, semicolons and capital letters so that it makes sense:
that that is is that that is not is not that that is not is not that that is that that is is not that that is not

18 Think of three (or more) majority-rules sound–spelling correspondences and then the several exceptions to each one that make learning to read English difficult. In the text, we noted that words such as *brave*, *cave*, *Dave*, *gave* and *slave*, in which *a* is followed by 'silent *e*', are pronounced [æɪ] /eɪ/, but *have* is exceptional in that the *a* is pronounced [æ]. Another example might be the *ea* spelling in *beak*, *leak*, *peak*, *weak* and *teak*, where it is pronounced [iː], with exceptions such as *steak*; or the late US president's name *Reagan*, where the *ea* is pronounced [æɪ] /eɪ/; or the past tense of *read* where it is pronounced /e/ /ɛ/.

19 Investigate *nushu* using the time-honoured template of answering: *what*, *who*, *where*, *when* and *why*. Using the internet, a good library or any other source, answer these questions.

- **a** What is nushu?
- **b** Who was involved with nushu?

c Where did nushu exist?
d When did nushu exist?
e Why did nushu exist?
f **Speculative:** Can you think of a situation in your own country that might give rise to a nushu-like situation?

20 **Challenge exercise:** Investigate the 1996 spelling reform in German-speaking countries. What are the countries involved? Are there reasons for the reform movement other than ease of learning and international communications? Give three reforms other than those mentioned in this book. What are some of the arguments against this spelling reform legislation? Do you think the spelling reform will 'take hold' in this century? Or will there be a return to the traditional system?

21 Spelling rhyme occurs when two words with similar spelling but different pronunciations are rhymed. Words like *move* and *love* are considered to rhyme by many poets; however, there must be a common consonant in the final syllable, in this case [v]. Examine your favourite poems, or the lyrics of your favourite songs, and find five instances of spelling rhyme.

> *Example*: in the late Michael Jackson's highly popular song 'Thriller' we find:
> Creatures crawl in search of *blood*
> To terrorise your *neighbourhood*
> where *blood* and *neighbourhood* are spelling rhymes.[9]

22 **Challenge exercise:** The writing system known as Abugida is used in a number of languages of the world including South Asian languages, Ethiopian Semitic languages (see **Figure 11.1**) and Canadian Aboriginal languages. Research this writing system and write a short essay by focusing on how it differs from other writing systems. As a starting point, you may consult the website *Omniglot: The Online Encyclopedia of Writing Systems and Languages* (https://www.omniglot.com).

23 **Challenge exercise:** Punctuation marks (e.g. the full stop) may have a different function and meaning in texting and internet language, what McCulloch (2019: 109) calls 'typographical tone of voice'. Research this topic, starting from McCulloch, and write a short essay.

24 **Challenge exercise:** The decipherment of the Maya script, shown below in **Figure 11.4**, has been described as 'one of the most exciting intellectual adventures of our age, on a par with the exploration of space and the discovery of the genetic code' (Coe 1992: 7).

Figure 11.4 **Maya glyphs**

Shutterstock.com/PremiumVector

Research this writing system and write a short essay. A good place to start would be this lecture by Michael Coe, one of the leading scholars on Mayan civilisation, https://www.youtube.com/watch?v=dqzScCfV274.

25 **Challenge exercise:** The Amharic language that you encountered in exercise 22 Chapter 4 has a writing system known as *Fidel*. It is an alpha-syllabary or abugida system where each symbol stands for a consonant and a vowel. The Fidel is read from left to right, and has thirty-three basic symbols and each symbol has seven different shapes (known as 'orders') corresponding to the seven vowels ([ə], [u], [i], [a], [e], [ɨ], [o]) of the language. Here are some examples:

በ [bə], ቡ [bu], ቢ [bi], ባ [ba], ቤ [be], ብ [bɨ], ቦ [bo]
መ [mə], ሙ [mu], ሚ [mi], ማ [ma], ሜ [me], ም [mɨ], ሞ [mo]
ሰ [sə], ሱ [su], ሲ [si], ሳ [sa], ሴ [se], ስ [sɨ], ሶ [so]
ረ [rə], ሩ [ru], ሪ [ri], ራ[ra], ሬ [re], ር [rɨ], ሮ [ro]
ለ [lə], ሉ [lu], ሊ [li], ላ [la], ሌ [le], ል [lɨ], ሎ [lo]

Note that the writing system does not distinguish between long and short consonants i.e. the difference between [b] (short) and [bb] (long) while phonologically significant in the language, it is not marked distinctively: both the short and long consonant are represented the same way. Using the above symbols, transcribe the following words into Amharic:

a	səbbərə	'to break'
b	məlləsə	'to return'
c	səlləlә	'to spy'
d	mərrərə	'to be bitter'
e	mələmmәlu	'they recruited'
f	bəlla	'to eat'
g	masəro	'pot'
h	bira	'beer'
i	molala	'oval'
j	leba	'thief'

26 **Challenge exercise:** You may have noticed a pattern in exercise 25 regarding how each character represents a syllable (consonant-vowel combination); that is, how each of the seven orders are represented. Now, if you know that the character ሸ represents the syllable [ʃə], can you determine the characters for the other six orders? (*Hint*: see the pattern for [s].)

Further reading

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Sampson, G 1985, *Writing systems: A linguistic introduction*, Stanford University Press, Stanford, CA.

Senner, W M (ed.) 1989, *The origins of writing*, University of Nebraska Press, Lincoln.

Weblinks

- http://lost-theory.org/ocrat/chargif – Here you will find out how to draw Chinese characters stroke by stroke.
- http://www.friesian.com/egypt.htm – Take a look at the history of Egyptian writing with illustrations from hieroglyphics.
- http://www.krysstal.com/writing_evolution.html – This site provides a nice flowchart for the evolution of writing systems.
- http://scripts.sil.org/cms/scripts/page.php?item_id=SitesOnScriptsAndWSs – This site provides links to sites that describe different scripts and writing systems in the world.
- http://www.ibiblio.org/expo/deadsea.scrolls.exhibit/intro.html – At this site you can view a dozen Dead Sea Scroll fragments and read a description of their content.
- http://www.valerieyule.com.au/writsys.htm – This page introduces writing systems of the world. Some of the interesting topics are writing system reforms, possibilities for spelling, spelling and literacy.
- http://www.krysstal.com/writing.html – A useful resource on the history, development, and evolution of the world's writing systems.

Endnotes

1 The pictograph for 'ox' evolved, much later, into the letter A.

2 McCulloch, G 2019 *Because internet: Understanding the new rules of language*. Riverhead Books, New York.

3 The symbol portrays the Pharaoh's staff.

4 Water trickling out of a vase.

5 Shaw, G B 1948, 'Preface', in R A Wilson, *The miraculous birth of language*, Philosophical Library, New York.

6 Robert N Feinstein 1986, 'Gnormal pspelling', from *Son of an Oyster*. Copyright © 1986 by Robert N. Feinstein. Reprinted by permission of Roger Lathbury DBA Orchises Press as representative for the estate of Robert N Feinstein.

7 The source of these examples, and many others, is Katzner, K 1975, *Languages of the world*, Funk & Wagnalls, New York.

8 (a) Annoyance. (b) My lips are sealed. (c) Condescension. (d) Ha, ha. (e) Surprise. (f) I'm yelling. (g) See no evil. (h) Not that funny.

9 Michael Jackson, *Thriller*. Lyrics written by Rodney Lynn Temperton. Lyrics © Universal Music Publishing Group. Reprinted by permission.

Glossary

abbreviation
The shortened form of a word.
accent (of a speaker)
The phonology or pronunciation of a specific **dialect**; may be native or non-native.
accidental gap
Phonological or morphological form that constitutes a possible but non-occurring lexical item.
acoustic
Pertaining to physical aspects of sound.
acoustic phonetics
The study of the acoustic characteristics of speech sounds.
acoustic signal
The sound waves produced by any sound source, including speech.
acquired aphasia
Language loss or disorders following brain damage.
acquired dyslexia
The loss of ability to read correctly by people who were previously literate, following brain damage.
acrolect
A prestigious variety of a language.
acronym
A word composed of the initials of several words, e.g. *PET scan* from *p*ositron *e*mission *t*omography scan.
adjective (Adj)
The **syntactic category** of words that function as the head of an **adjective phrase** and that have the semantic effect of qualifying or describing the referents of nouns; see also **adjective phrase.**
adjective phrase (AdjP)
A **syntactic category**, also **phrasal category**, comprising expressions whose head is an adjective possibly accompanied by modifiers, that occurs inside noun phrases and as **complements** of the verb *be*.
adjuncts
An optional phrase that is not selected by the verb.
adverb (Adv)
The **syntactic category** of words that qualify the verb, such as manner adverbs like *quickly* and time adverbs like *soon*. Some adverbs, such as *very*, qualify adjectives. The position of the adverb in the sentence depends on its semantic type.
adverb phrase (AdvP)
A **syntactic category,** also **phrasal category**, comprising expressions whose head is an adverb possibly accompanied by modifiers.
affix
A bound morpheme attached to a stem or root; see **prefix**, **suffix**, **infix**, **circumfix**, **stem**, **root**.
affricate
A sound produced by a stop closure followed immediately by a slow-release characteristic of a fricative; phonetically a single sound created by the sequence of stop + fricative, e.g. the *ch* in *chip* is [ʧ].
agglutinative language
A type of synthetic language in which words may be formed by a root and multiple affixes where the affixes are easily separated and always retain the same meaning.
agreement
The process by which one word in a sentence is altered depending on a property of another word in that sentence, such as person, gender or number.
allograph
One of the various alternative forms of an alphabetic letter, for example, the capital, lower-case, italicised or handwritten versions of the letter *A*.
allomorph
Alternative surface form of a morpheme, e.g. the [s], [z] and [əz] forms of the plural morpheme in *cats*, *dogs* and *kisses*.
allophone
A predictable phonetic realisation (pronunciations) of a phoneme, e.g. [p^h] and [p] are allophones of the phoneme /p/ in English, for example, in words like *pout* and *spout* respectively.
alphabet abbreviations
Acronyms produced by sounding out each letter, as in AFL for Australian Football League.
alphabetic writing
A writing system in which each symbol typically represents one sound segment.
alveolar ridge
The rough ridge on the roof of the mouth directly behind the top front teeth. It is the place of articulation for speech sounds like [s], [t], [n].
alveolar sound
A sound produced by raising the tongue to the alveolar ridge.

analogic change
A language change in which a rule spreads to previously unaffected forms, e.g. the plural of *cow* changed from the earlier *kine* to *cows* by the generalisation of the plural formation rule or by analogy to regular plural forms.
anomalous
Semantically ill formed though typically obeying syntactic rules.
anomaly
A violation of semantic rules resulting in expressions that seem nonsensical.
anomia; anomic aphasia
A form of **aphasia** in which patients have word-finding difficulties.
antecedent
A noun phrase with which a pronoun is **coreferential**.
anterior
A phonetic feature of consonants whose place of articulation is in front of the palatoalveolar area, including **labials, interdentals** and **alveolars**.
antiautonyms
A pair of morphologically related words that have the same or nearly the same meaning though it looks like one is derived from the other by attaching the negative prefix *in-*, e.g. *flammable, inflammable*.
antonyms
Words that are opposite with respect to one of their semantic properties.
approximants
Continuant sounds in which the articulators allow air to flow through the vocal tract without occlusion or constriction, e.g. [j], [w], [ɹ] and [l] in English, where the first three are central approximants and [l] is a lateral approximant.
arbitrary
Describes the property of language, including sign language, whereby there is no natural or intrinsic relationship between the way a word is pronounced (or signed) and its meaning.
argot
The informal specialised words used by a particular group.
argument structure
The various NPs that occur with a particular verb, called its arguments, e.g. **intransitive** verbs take a subject NP only; **transitive** verbs take both a subject and direct object NP.
arguments
The various NPs that occur with a verb, e.g. *Jack* and *Jill* are arguments of *loves* in *Jack loves Jill*.
articulators
The tongue, lips, **velum** etc. that change the shape of the vocal tract to produce different speech sounds.
articulatory phonetics
The study of how the vocal tract produces speech sounds – the physiological characteristics of speech sounds.
aspirated
Describes a voiceless stop produced with a puff of air that results when the vocal folds remain open for a brief period after the release of the stop, e.g. the [p^h] in *pit.* (Aspiration is indicated by the superscript *h* in the IPA.)
assimilation process
A phonological process that changes feature values of segments to make them more similar, e.g. a vowel becomes [+nasal] when followed by a [+nasal] consonant; also called feature-spreading.
asterisk
The symbol * used to indicate ungrammatical or anomalous examples; for example, **cried the baby*, **sincerity dances*; also used in historical and comparative linguistics to represent a reconstructed form.
auditory phonetics
The study of the perception of speech sounds.
Australian Sign Language (Auslan)
The sign language used by the deaf community in Australia; see also sign languages.
autoantonym
A word that has two opposite meanings, e.g. *cleave*, 'to split apart' or 'to cling together'; see also **antonyms**.
auxiliary (Aux)
A **syntactic category** comprising auxiliary verbs and abstract tense morphemes; functions as the **head** of a sentence.
babbling
Sounds produced in the first few months after birth that gradually come to include only sounds that occur in the language of the household. Deaf children babble with hand gestures.
back-formation
Creation of a new word by removing an **affix** from an old word, or by removing what is mistakenly considered an affix.

basilect
A less prestigious variety of a language.
bilabial sound
A sound articulated by bringing both lips together.
bilingual language acquisition
The (more or less) simultaneous acquisition of two or more languages before the age of three years such that each language is acquired with native competency.
bird call
One or more short notes that convey messages about the immediate environment, such as danger, feeding, nesting and flocking.
birdsong
A complex pattern of notes used by birds to mark their territory and to attract mates.
blade of the tongue
The part of the top surface of the tongue behind the tip.
blend
A word composed of the parts of more than one word, e.g. *smog* from *smoke* + *fog*.
blocked
A derivation that is prevented by a prior application of morphological rules.
borrowing
The incorporating of a loan word from one language into another.
bottom-up processing
Data-driven analysis of linguistic input that begins with the small units, such as phones, and proceeds step by step to increasingly larger units, such as words and phrases, until the entire input is processed, often ending in a complete sentence and semantic interpretation.
bound morpheme
A morpheme that must be attached to other morphemes, such as *-ly*, *-ed*, *non-*; they are **prefixes**, **suffixes**, **infixes**, **circumfixes** and some **roots**; see also **free morpheme**.
broad (phonemic) transcription
The **phonemic representation** of speech sounds using phonemic symbols (ignoring phonetic details that are predictable), usually given between forward slashes, e.g. /pɪt/, /spɪt/ for *pit*, *spit*, as opposed to the narrow phonetic representation that captures more detail, e.g. [pʰɪt].
broadening
A semantic change in which the meaning of a word changes over time to become more encompassing, e.g. *dog* once meant ‘a particular breed of dog’.
Broca’s aphasia (agrammatism)
A language disorder usually resulting from damage to Broca’s region in which the patient has difficulty with certain aspects of syntax, especially functional categories; also called **agrammatism**.
Broca’s area
A front (anterior) part of the left hemisphere of the brain, damage to which causes agrammatism or **Broca’s aphasia**; also called Broca’s region.
calligraphy
The art of writing or drawing Chinese characters.
case
A characteristic of nouns and pronouns, and in some languages articles and adjectives, determined by the function in the sentence, and generally indicated by the morphological form of the word.
case endings
Suffixes on the noun based on its grammatical function, such as *’s* of the English genitive case indicating possession, e.g. *Robert’s sheepdog*.
case morphology
The process of **inflectional morphemes** combining with nouns to indicate the **grammatical relation** of the noun in its sentence.
categorical perception
The perception that allows speakers to distinguish sounds that differ along a continuum as belonging to the same phoneme in their language.
cause/causative
The thematic role of the noun phrase whose referent is a natural force that is responsible for a change, e.g. *The wind* in *The wind damaged the roof*.
central
A sound in which air flows along a central pathway through the mouth to the outside air.
cerebral hemispheres
The left and right halves of the brain, which are joined by the **corpus callosum.**
characters (Chinese)
The units of Chinese writing, each of which represents a morpheme or word.

circumfix
A bound morpheme, parts of which occur in a word both before and after the **root**.
classifier
A grammatical morpheme that marks the semantic class of a noun.
classifier verb stem
In some polysynthetic languages, including the Daly languages, the verb is formed by two separate parts; the classifier stem categorises the event.
click
A speech sound produced by an articulation that involves sucking air into the mouth through the activity of the tongue, e.g. the sound often spelt *tsk* in English is an example of a click sound.
clipping
The deletion of some part of a longer word to give a shorter word with the same meaning, e.g. *phone* from *telephone*.
closed class
A category, generally a **functional category**, that rarely has new words added to it, such as articles, conjunctions.
coarticulation
The spreading of phonetic features through gestural overlap in either the anticipation of, or perseveration (the carrying over) of, articulatory processes, e.g. vowels become [+nasal] when followed by consonants that are [+nasal] in the same syllable.
coda
One or more consonants that follow the nucleus of a syllable, e.g. /mp/ in /stæmp/ *stamp*.
codeswitching
The movement back and forth between two languages or dialects within or between sentences or discourse.
cognates
Words in related languages that developed from the same ancestral **root**.
comparative method
The technique linguists use to deduce forms in an ancestral language by examining corresponding forms in several of its descendent languages.
comparative reconstruction
The deducing of forms in the ancestral language of genetically related descendent languages by application of the **comparative method**.
complement
The constituent(s) in a phrase other than the head that complete(s) the meaning of the phrase and is(are) **c-selected** by the verb.
complementary distribution
The situation in which phones do not occur in the same phonetic environment, e.g. [s] and [sʷ] in English words like *see* and *saw* respectively.
complementary pair
Two **antonyms** related in such a way that the negation of one is the meaning of the other.
complementiser (C)
A **syntactic category**, also **functional category**, comprising words, including *that*, *if*, and *whether*, that introduce an embedded sentence; has the effect of turning a sentence into a complement.
complementiser phrase (CP)
A phrase whose head C may introduce a **complementiser** (e.g. *that*) and possibly a preposed Aux, and whose complement is S.
compositional semantics
A theory of meaning that calculates the **truth value** or meaning of larger units by the application of semantic rules to the **truth value** or meaning of smaller units.
compound
A word composed of two or more words, which may be written as a single word or as words separated by spaces or hyphens.
conditioned sound change
Historical phonological change that occurs in specific phonetic contexts, e.g. the voicing of /f/ to [v] when it occurs between vowels.
conjunction (Conj)
The **syntactic category**, also **functional category**, of words that join two like syntactic categories together.
connotative meaning/connotation
The evocative or affective meaning associated with a word. Two words or expressions may have the same **denotative meaning** but different connotations, e.g. *horse* and *nag*.
consonant
A speech sound produced with some constriction of the vocal tract; see also **vowel**.

consonantal
A phonetic feature distinguishing the class of **obstruents**, **liquids** and **nasals**, which are [+consonantal], from other sounds (**vowels** and **semivowels**), which are [–consonantal].

consonantal alphabet writing
A writing system of symbols that represent only **consonants**; **vowels** are inferred from context, e.g. Arabic.

constituent
A syntactic unit in a tree diagram.

constituent structure
The hierarchically arranged syntactic units, such as noun phrase and verb phrase, that underlie every sentence.

content word
Nouns, verbs, adjectives and adverbs; constitute a major part of the vocabulary.

context
The discourse preceding an utterance together with the real-world knowledge of speakers and listeners; see also **linguistic context**, **situational context**.

continuant
A speech sound in which the airstream flows continuously through the mouth; that is, all speech sounds except stops and affricates.

contour tone
A **tone** in which the pitch glides from one level to another.

contradiction
A sentence that is false by virtue of its meaning alone, irrespective of context; see **analytic**, **tautology**.

contradictory
Mutual negative entailment; the truth of one sentence necessarily implies the falseness of another sentence, and vice versa.

contralateral
Refers to the transmission of sensory information from one side of the body (left/right) to the opposite **cerebral hemisphere** (right/left).

contrast
Different sounds contrast when their presence alone distinguishes between otherwise identical forms, e.g. alternating [f] and [v] in *fine* and *vine* creates two separate words, but alternating [p] and [pʰ] in [spi:k] and [spʰi:k] results in two variant ways of saying *speak*, though the second variant would sound a bit strange.

contrasting tones
In **tone languages**, different **tones** that make different words, e.g. in Nupe, *bá* with a high tone and *bà* with a low tone mean ‘be sour’ and ‘count’ respectively.

contrastive stress
Additional stress placed on a word to highlight it or to clarify the referent of a pronoun.

convention/conventional
The agreed-on, though generally arbitrary, relationship between the form and meaning of words.

cooperative principle
A broad principle within whose scope fall the various maxims of conversation. It states that in order to communicate effectively, speakers should agree to be informative and relevant.

coreferential
Describes noun phrases (including pronouns) that refer to the same entity.

coronal
A sound articulated by raising the tip or blade of the tongue, including **alveolars** and **postalveolars**, e.g. /t/, /ʃ/.

corpus callosum
The nerve fibres connecting the right and left **cerebral hemispheres**.

cortex
The approximately 10 billion neurons that form the outside layer of the brain; also referred to as ‘grey matter’.

count noun
A noun that can be enumerated, e.g. *one potato*, *two potatoes*.

creative aspect/creativity of language
Speakers’ ability to combine the finite number of linguistic units of their language to produce and understand an infinite range of novel sentences.

creole
A language that begins as a **pidgin** and eventually becomes the first language of a speech community through its children.

critical age hypothesis
The theory that states that there is a window of time between birth and middle childhood for learning a first language, beyond which first-language acquisition is almost always incomplete.

critical period
The time between birth and puberty during which a child can acquire language easily, swiftly and without external intervention. After this period, acquisition of the **grammar** is difficult and, for some individuals, never fully achieved. Children deprived of language during this critical period show atypical patterns of brain **lateralisation**.

c-selection
The classifying of verbs and other lexical items in terms of the **syntactic category** of the **complements** that they accept (*c* stands for *categorial*), sometimes called subcategorisation.

cuneiform
A form of writing in which the characters are produced using a wedge-shaped stylus.

declarative sentence
A sentence that asserts that a particular situation exists; often contrasted with an interrogative sentence.

declension
A list of the inflections or cases of nouns, pronouns, adjectives and determiners in categories such as grammatical relationship, number and gender.

deep dyslexia
A reading disorder in which the dyslexic person makes substitutions with semantically similar words

deictic/deixis
Refers to words or expressions whose reference relies entirely on context and the orientation of the speaker in space and time.

denotative meaning
The referential meaning of a word or expression.

dental sound
A sound articulated with the tongue against, or nearly against, the front teeth.

derivation
The steps describing the processes that apply to an underlying form that result in a surface representation, e.g. in deriving a phonetic form from a phonemic form.

derivational morpheme
A morpheme added to a **stem** or **root** to form a new stem or word, possibly, but not necessarily, resulting in a change in **syntactic category**.

derived word
The form that results from the addition of a derivational morpheme.

descriptive grammar
A linguist's description or model of the mental grammar, including the units, structures and rules; an explicit statement of what speakers know about their language.

determiner (Det)
The **syntactic category**, also **functional category**, comprising words and expressions that, when combined with a noun, form a noun phrase. Includes the **articles** *the* and *a*, **demonstratives**, such as this or *that*, quantifiers, such as *each* and *every*, and expressions, such as *William's*.

developmental language disorder (DLD)
Difficulty in acquiring language experienced by certain children.

diacritics
Additional markings attached to (or adjacent to) IPA symbols used to specify various phonetic properties, such as **length**, **tone**, **stress** and **nasalisation** to name a few.

dialect
A variety of a language whose grammar differs in systematic ways from other varieties. Differences may be lexical, phonological, syntactic and/or semantic.

dialect levelling
A decrease in variation among **dialects**.

dialect region
A geographic area defined by the predominant use of a particular language variety, or a particular characteristic of a language variety; see **dialect**.

digraph
Two letters used to represent a single sound, e.g. *gh* represents [f] in *enough*.

diphthong
A dynamic vowel produced by the movement of the articulators from one position to another, as in *buy*, *bough*, *bay*.

direct object
The noun phrase (NP) that appears immediately below the verb phrase (VP) that is sister to the verb; the noun phrase complement of a transitive verb.

discourse
A linguistic unit that usually comprises more than one sentence.

discourse analysis
The study of **discourse**.
discreteness
A fundamental property of human language in which larger linguistic units are perceived to be composed of smaller linguistic units, e.g. *cat* is perceived as the phonemes /k/, /æ/, /t/; *the cat* is perceived as *the* and *cat*.
displacement
The capacity to talk (or sign) messages that are unrelated to here and now.
dissimilation
A phonological process that changes feature values of segments to make them less similar; e.g. a fricative dissimilation rule: /θ/ is pronounced [t] following another fricative. In English dialects with this rule, *sixth* /sɪks + θ/ is pronounced [sɪkst].
distributional criteria
Criteria for testing the **syntactic category** of a word that depend on the affixes a word combines with and its position in a phrase or sentence.
dominate
In a **phrase structure tree**, when a continuous downward path can be traced from a node labelled A to a node labelled B, then A dominates B.
dorsal
A sound articulated by raising the back of the tongue towards the **velum**, e.g. /k/, /g/, /ŋ/.
downstep
The lowering of the absolute pitch of **tones** during an utterance, during which tones retain their relative values to one another.
d-structure
Refers to the phrase structure tree before any transformations take place.
dyslexia
A cover term for the various types of reading impairment.
Early Middle English vowel shortening
A sound change that shortened vowels such as the first *i* in *criminal*. As a result *criminal* was unaffected by the **Great Vowel Shift**, leading to word pairs such as *crime/criminal.*
ease of articulation
The tendency for speakers to use efficient articulatory strategies. **Phonological processes** are often the result of ease of articulation, e.g. the rule of English that nasalises vowels when they precede a nasal consonant.
ejective
A speech sound produced when air in the mouth is pressurised by an upward movement of the larynx, then released.
embedded clause
A clause that is subordinate to the main clause of the sentence.
emoji
A small image or icon used in SMS, email and other forms of electronic communication, to express an idea or emotion, among other things.
emoticon
A string of text characters that, when viewed sideways, forms a face expressing a particular emotion, frequently used in email.
endocentric compound
A compound with a head; one of the words in the compound functions as the head of the construction in determining its meaning and syntactic category.
entailment
The relationship between two sentences where the truth of one necessarily follows from the truth of the other.
epenthesis
The insertion of one or more phones in a word, e.g. the insertion of /ə/ in *children* to produce /ʧɪlədɹən/ instead of /ʧɪldɹən/.
eponym
A word taken from a proper name, such as *Hertz* for ‘unit of frequency’.
ergative language
An ergative language is one in which the actor of an intransitive sentence and the patient of a transitive sentence are treated in the same way morphologically or syntactically. Examples of ergative languages are Samoan, Tongan, Basque and Georgian.
etymology
The history of words; the study of the history of words.
euphemism
A word or phrase that replaces a taboo word or is used to avoid reference to certain acts or subjects, e.g. *powder room* for *toilet*.
event/eventive
A type of sentence that describes activities, such as *John kissed Mary*, as opposed to describing states, such as *John knows Mary*.

event-related potentials (ERPs)
The electrical signals emitted from different areas of the brain in response to different kinds of stimuli.

exemplar theories
Theories of phonology that consider that words are stored in memory along with their acoustic, social and contextual information intact.

exocentric compound
A compound that lacks a head: none of the elements in the compound can function as the head of the construction.

feature
Specifies a property of a **syntactic category**; Aux is specified for tense and person.

feature matrix
A representation of phonological segments in which the columns represent segments and the rows represent features, each cell being marked with a + or – to designate the value of the feature for that segment.

feature-changing processes
Change in the feature values of segments, either to make them more similar (see **assimilation**) or less similar (see **dissimilation**).

form
The phonological or gestural representation of a morpheme or word.

formant
In the frequency analysis of speech, a band of frequencies of higher intensity than surrounding frequencies, which appears as a dark line on a **spectrogram**. Individual vowels display different formant patterns.

fossilisation
A characteristic of second-language learning in which the learner reaches a plateau and seems unable to acquire some property of the L2 **grammar**.

free morpheme
A single **morpheme** that constitutes a word.

fricative
A **consonant** sound produced with such a narrow constriction in the vocal tract that a hissing sound is created.

front vowel
A vowel sound in which the tongue is positioned forward in the mouth.

function word
A word that does not have clear lexical meaning but has a grammatical function; function words include **conjunctions, determiners, auxiliaries and complementisers**.

functional categories
Categories whose members are characterised by their grammatical functions, including **determiner**, **auxiliary**, **complementiser** and **conjunction**.

functional MRI (fMRI)
A technique that measures small changes in blood flow that occur over time as a consequence of neural activity.

fundamental difference hypothesis
The hypothesis that **second-language (L2) acquisition** differs fundamentally from first-language (L1) acquisition.

fundamental frequency
In speech, the rate at which the vocal folds vibrate, symbolised as F0, called F-zero, perceived by the listener as **pitch**.

garden path sentences
Sentences that appear at first blush to be **ungrammatical**, but with further syntactic processing turn out to be **grammatical**, e.g. *The horse raced past the barn fell*.

geminate
A sequence of two identical sounds that differ only in length; the long consonant is denoted either by writing the phonetic symbol twice as in [sakki] or by use of a length diacritic as in [sak:i].

generic term
A word that applies to a whole class, such as *dog* in *the dog is found throughout the world*.

genetically related
Describes two or more languages that developed from a common, earlier language, e.g. French, Italian and Spanish, which all developed from Latin.

glide
An approximant consonant, such as /w/ or /j/; also referred to as **semivowels** due to their vowel-like articulatory and acoustic properties.

gloss
A word in one language given to express the meaning of a word in another language; for example, 'house' is the English gloss for the French word *maison*.

glottal/glottal stop
A sound produced with constriction at the glottis; when the air is stopped completely at the glottis by tightly closed vocal folds, a glottal stop is produced.
glottis
The opening between the vocal folds.
gradable pair
Two **antonyms** related in such a way that more of one is less of the other.
gradual language death
Disappearance of a language over a period of several generations, each of which has fewer speakers of the language, until finally no speakers remain.
grammar
A linguistic description of a speaker's mental grammar; the mental representation of a speaker's linguistic competence; what a speaker knows about a language.
grammar translation
A method of second-language learning in which the student memorises words and syntactic rules and translates them between the native language and the target language.
grammatical
Describes a well-formed sequence of words, one conforming to rules of syntax.
grammatical morpheme
A **closed class** word or **bound morpheme** required by the syntactic rules; see also **inflectional morpheme**.
grammatical relation
Any of several structural positions that a noun phrase may assume in a sentence.
graphemes
The symbols of an **alphabetic writing** system; the letters of an alphabet.
Great Vowel Shift
A sound change that took place in English some time between 1400 and 1600 CE in which seven long vowel **phonemes** were changed.
Grimm's Law
The description of a phonological change in the sound system of an early ancestor of the Germanic languages, formulated by Jakob Grimm.
Hangul
An alphabet for writing the Korean language based on the phonemic principle, designed in the fifteenth century.
head (of a compound)
The rightmost word (in English).
head (of a phrase)
The central word of a phrase whose **lexical category** defines the type of phrase.
head parameter
The parameter that provides language learners with a binary 'menu' option, for the head of a phrase to either precede or follow its complement.
hemispherectomy
The surgical removal of a hemisphere of the brain.
heritage language
A language with which a person has a strong cultural connection through family interaction, but which is not learnt natively, e.g. Yiddish in a Jewish household.
hierarchical structure
The groupings and subgroupings of the parts of a sentence into **syntactic categories**; the groupings and subgroupings of morphemes in a word; hierarchical structure is generally depicted in a **tree diagram**.
hieroglyphics
A pictographic writing system used by the Egyptians around 4000 BCE.
hiragana
A Japanese **syllabary** used to write native words of the language, most often together with ideographic characters.
historical and comparative linguistics
The branch of linguistics that deals with how languages change, what kinds of changes occur and why they occur.
holophrastic
The stage of child language acquisition in which one word conveys a complex message similar to that of a phrase or sentence.
home sign
The gestural system made up by deaf children to communicate with their hearing family.
homograph
A word spelt identically to another but pronounced differently, e.g. lead, the metal, and lead, what leaders do.
homonym
A word pronounced the same as another and spelt the same, e.g. bat the animal, bat the stick, and bat meaning 'to flutter' as in bat the eyelashes.

homophone
A word pronounced identically to another but spelt differently, e.g. bare meaning 'without covering, unconcealed' and bear the animal; also to, too, two.

homorganic consonants
Two sounds produced at the same place of articulation, e.g. /m/ and /p/; and /t/, /d/ and /n/.

homorganic nasal rule
A phonological **assimilation rule** that changes the place of articulation feature of a nasal consonant to agree with that of a following consonant, e.g. /n/ becomes [ŋ] when preceding /k/, as in *incomplete*.

hypocoristic
A shortened form of a word – used particularly in Australian slang and often ending in 'ie' or 'o' as in *mossie* for *mosquito* or *ambo* for *ambulance officer*.

hyponym
A word whose meaning is a specific instance of a more general meaning, e.g. *red*, *white* and *blue* are hyponyms of the word *colour*.

iambic
Stress on the second **syllable** of a two-syllable word, e.g. *giráffe.*

iconic/iconicity
A non-arbitrary relationship between form and meaning in which the form bears a resemblance to its meaning, e.g. the male and female symbols on (some) toilet doors.

ideogram, ideograph
A character of a word-writing system, often highly stylised, that represents a concept, or the pronunciation of the word representing that concept.

idiolect
Each individual's way of speaking.

idiom/idiomatic phrase
An expression whose meaning does not conform to the principle of compositionality; that is, may be unrelated to the meaning of its parts.

ill formed
Describes an ungrammatical or anomalous sequence of words.

illocutionary force
The effect of a speech act, such as a warning, a promise, a threat or a bet.

imitation
A proposed mechanism of child language acquisition whereby children learn their language by imitating adult speech in context.

immediately dominate
In a **phrase structure tree**, if a node labelled A is directly above a node labelled B, then A immediately dominates B.

implicatures/implication
A way in which some linguists describe presupposition, e.g. *John wants more coffee* carries the implication or **entails** that John has already had some coffee; see also **entailment**, **presupposition**.

implosive
A speech sound that involves the downward movement of the larynx forcing air into the mouth.

impoverished data
The incomplete, noisy and unstructured utterances that children hear, including slips of the tongue, false starts and ungrammatical and incomplete sentences.

indirect object
The noun phrase that is either (i) inside a PP that appears immediately below the verb phrase (VP) or (ii) immediately below the VP. The indirect object occurs in addition to a direct object NP, and often expresses the recipient of an action, e.g. *the boy* in *Susan gave the puppy to the boy* and *him* in *Susan gave him the puppy*.

individual bilingualism
The ability of an individual speaker to speak two languages with native or near-native proficiency.

Indo-European /Proto-Indo-European
The descriptive name given to the ancestor language of many modern language families, including Germanic, Slavic and Romance.

infant-directed speech (IDS)
The special intonationally exaggerated speech that adults sometimes use to speak with young children, sometimes called baby talk or 'motherese'.

infinitive
The uninflected or stem form of a verb that does not express tense, e.g. *(to) swim*.

infix
A **bound morpheme** that is inserted in the middle of a word or **stem**.

inflectional morpheme
A bound **grammatical morpheme** that is affixed to a word according to rules of **syntax**.
initiation time
The amount of planning time taken before a speaker utters a given structure,
innateness hypothesis
The theory that the human species is genetically equipped with a **Universal Grammar**, which provides the basic design for all human languages.
intensity
The magnitude of an acoustic signal, which is perceived as loudness.
interdental sound
A sound produced by inserting the tip of the tongue between the upper and lower teeth.
interlanguage grammar
The intermediate **grammar** that a second-language learner creates on the way to acquiring the (more or less) complete **grammar** of the target language.
International Phonetic Alphabet (IPA)
The phonetic alphabet designed by the International Phonetic Association and used to represent the speech sounds found in all human languages. The IPA aims to provide a one-to-one relationship between each symbol and each speech sound.
International Phonetic Association
An organisation founded in 1888 to further the scientific study of phonetics and to develop and maintain the International Phonetic Alphabet.
intonation
The pitch contour of a phrase or sentence.
intransitive verb
A verb that must not have (does not **c-select** for) a direct object **complement**.
jargon
Special words peculiar to the members of a profession or group, e.g. *airstream mechanism* for phoneticians.
jargon aphasia
A form of **aphasia** in which **phonemes** are substituted, resulting in **nonsense words**; often produced by people who have **Wernicke's aphasia**.
kana
The characters of either of the two Japanese **syllabaries**, **katakana** and **hiragana**.
kanji
The Japanese term for the Chinese characters used in Japanese writing.
katakana
A Japanese **syllabary** generally used for writing **loan words** and to achieve the effect of italics.
labial
A sound articulated with the lips, e.g. /b/, /f/, /m/.
labiodental sound
A sound produced by touching the bottom lip to the upper teeth.
labiovelar
A sound articulated by simultaneously raising the back of the tongue towards the **velum** and rounding the lips.
language attrition
The gradual loss of **heritage-language** competence owing to lack of use.
larynx
The structure in the throat made up of cartilages and muscles that separates the lower and upper respiratory tracts and contains the **glottis** – the space between the vocal folds.
late closure principle
The principle that, in comprehending language, listeners attach incoming material to the phrase that was most recently processed, e.g. *He said that he slept yesterday* associates *yesterday* with *he slept* rather than with *he said*.
lateral sound
A sound produced with air flowing around the side(s) of the tongue.
lateralisation; lateralised
Refers to cognitive functions localised to one or the other side of the brain.
length
A feature referring to the duration of a segment. Two sounds may contrast in length, e.g. in Japanese, the *k* in the middle of the word *kakko*, 'parenthesis', is long but in *kako,* 'past', it is short.
lexical access
The process of searching the mental lexicon for a phonological string to determine if it is an actual word.
lexical ambiguity
Multiple meanings of sentences due to words that have multiple meanings.

lexical category
A general term for the word-level **syntactic categories** of **noun**, **verb**, **adjective**, **adverb** and **preposition**.
lexical decision
Task in which participants must indicate by button press whether a written or spoken stimulus is a word or nonword.
lexical paraphrase
A sentence that has the same meaning as another due to **synonyms**.
lexical semantics
The subfield of semantics concerned with the meanings of words and the meaning relationships among words.
lexical verb stem
The lexical verb stem is the part of the two-part verb that carries the primary meaning.
lexicon
The component of the grammar containing a speaker's knowledge about morphemes and words; a speaker's mental dictionary.
lingua franca
A language common to speakers of diverse languages that can be used for communication and commerce.
linguistic competence
The knowledge of a language represented by the mental grammar that accounts for speakers' linguistic ability and creativity. For the most part, linguistic competence is unconscious knowledge.
linguistic context
The discourse that precedes a phrase or sentence that helps clarify meaning.
linguistic determinism
The strongest form of the Sapir–Whorf hypothesis, which holds that the language we speak establishes how we perceive and think about the world.
linguistic performance
The use of linguistic competence in the production and comprehension of language; behaviour as distinguished from linguistic knowledge.
linguistic relativism
A weaker form of the Sapir–Whorf hypothesis, which holds that different languages encode different categories, and that speakers of different languages therefore think about the world in different ways. Speakers of languages that are poor in their number of colour words, for example, will be less sensitive to gradations of colour.
linguistic sign
A sound or gesture, typically a **morpheme** in spoken languages and a **sign** in **sign languages**, that has a form bound to a meaning in a single unit.
liquid
A sound such as /l/ or /ɹ/ that has vowel-like acoustic properties and may function phonetically as a syllabic **nucleus** in many varieties of English.
loan translation
A compound word or expression whose parts are translated literally into the borrowing language.
loan word
A word in one language whose origins are in another language.
localisation
The hypothesis that different areas of the brain are responsible for distinct cognitive systems; see **lateralisation**.
logograms
The symbols of a **word-writing** or logographic writing system.
long-distance *wh*-question
A long-distance *wh*-question is one in which the *wh*-phrase has moved out of the embedded clause to its initial position in the question, e.g. *Who do you think took my iPhone?*
magnetic resonance imaging (MRI)
A technique to investigate the molecular structures in human organs, including the brain, which may be used to identify sites of brain lesions.
magnetoencephalography (MEG)
A neuroimaging technique used to measure magnetic fields generated by the brain.
main verb
The verb that functions as the head in the highest verb phrase of a sentence.
manner of articulation
The way the airstream is obstructed as it travels through the vocal tract. **Stop**, **nasal**, **affricate** and **fricative** are some manners of articulation.

marked
In a **gradable pair** of **antonyms**, the word that is not used in questions of degree, e.g. *low* is the marked member of the pair *high/low* because we ordinarily ask 'How *high* is the mountain?' not '*How *low* is the mountain?'

mass noun
A noun that cannot ordinarily be enumerated, e.g. *milk*, *water*; **two milks* is **ungrammatical** except when interpreted to mean 'two kinds of milk', 'two containers of milk' and so on.

mean length of utterance (MLU)
The average number of words or morphemes in a child's utterance; a more accurate measure of a child's language development than chronological age.

meaning
The conceptual or semantic aspect of a sign or utterance that permits us to comprehend the message being conveyed. Expressions in language generally have both form – pronunciation or gesture – and meaning.

mental grammar
The internalised grammar that a descriptive grammar attempts to model; see linguistic competence.

mental lexicon
The internalised knowledge native speakers (signers) have about the pronunciation, morphological structure, syntactic properties, and meaning of words.

metalinguistic awareness
A speaker's conscious awareness *about* language and the use of language, as opposed to linguistic *knowledge*, which is largely unconscious.

metaphor
A non-literal, suggestive meaning in which an expression that designates one thing is used implicitly to mean something else.

metathesis
The phonological process that reorders segments, often by transposing two sequential sounds, e.g. the pronunciation of *ask* in some English varieties as 'aks'.

metonym, metonymy
A word substituted for another word or expression with which it is closely associated.

minimal attachment principle
The principle that, in comprehending language, listeners create the simplest structure consistent with the **grammar**, e.g. *The horse raced past the barn* is interpreted as a complete sentence rather than a noun phrase containing a relative clause, as if it were *the horse* (that was) *raced past the barn*.

minimal pair
Two (or more) separate words that are identical except for one sound segment that occurs in the same position in each word, e.g. *pan* /pæn/, *ban* /bæn/, *man* /mæn/.

modal
An **auxiliary verb** other than *be*, *have* and *do*; such as *can*, *could*, *will*, *would* and *must*.

modularity
The organisation of the brain and mind into distinct, independent and autonomous parts that interact with each other.

monomorphemic word
A word that consists of one **morpheme**.

monophthong
A simple vowel produced with a relatively stable articulatory position in the absence of surrounding consonants, e.g. *e* in *bed*.

monosyllabic
Having one syllable.

morpheme
The smallest unit of linguistic meaning or function.

morphological priming
One kind of semantic priming in which one morpheme from a word consisting of several morphemes primes a word related in meaning.

morphological rules
Rules for combining **morphemes** to form **stems** and words.

morphology
The study of the structure of words; the component of the grammar that includes the rules of word formation.

morphophonemic orthography
A writing system, such as that for English, in which morphological knowledge is needed to read correctly, e.g. in *please/pleasant* the *ea* represents [iː]/[e].

morphophonemic rules
Rules that describe the pronunciation of morphemes; a **morpheme** may have more than one variant (allomorphs)

that can be explained by such rules, e.g. the plural morpheme in English.

multilingualism
The ability to speak more than two languages.

narrowing
A semantic change in which the meaning of a word changes in time to become less encompassing.

nasal cavity
The passageway between the throat and the nose through which air passes during speech if the **velum** is lowered; see also **oral cavity**.

nasal (nasalised) sound
A speech sound produced with a lowered **velum** (and therefore an open nasal passage) allowing air to pass through the nose as well as into the mouth, e.g. [m].

natural class
A class of sounds characterised by a phonetic property or feature that pertains to all members of the set, e.g. the class of stops. A natural class may be defined with a smaller feature set than that of any individual member of the class.

neo-grammarians
A group of nineteenth-century linguists who claimed that sound shifts (i.e. changes in phonological systems) are not merely tendencies but apply in all words that meet their environment.

neurolinguistics
The branch of linguistics concerned with the brain mechanisms that underlie the acquisition and use of human language; the study of the neurobiology of language.

neutralisation
A phonological process that potentially removes the contrast between two phonemes in certain environments, e.g. in some **dialects** of English /t/ and /d/ are both produced as **voiced** taps between vowels, as in *writer* and *rider*, thus neutralising the voicing distinction.

node
A labelled branch point in a phrase structure tree.

non-continuant
A sound in which air is blocked momentarily in the oral cavity as it passes through the vocal tract; see also **stops**, **affricates**.

nonsense word
A permissible phonological form without meaning, e.g. *slithy*.

Nostratic
A hypothetical language that is postulated as the first human language.

noun (N)
The **syntactic category** of words that can function as the head of a noun phrase, such as *book*, *Jean*, *sincerity*. In many languages, nouns are grammatically marked for number, case and gender and occur with determiners.

nucleus
That part of a syllable that has the greatest acoustic energy; the vowel portion of a syllable, e.g. /æ/ in /pæt/ *pat*.

obstruent
A sound from the class of sounds consisting of oral **stops**, **fricatives** and **affricates**; non-sonorants.

onomatopoeia/onomatopoeic
Refers to words whose pronunciations suggest their meaning, e.g. *meow, buzz*.

onset
One or more consonants that precede the syllable nucleus, e.g. /st/ in /stæmp/ *stamp*.

open class
The class of lexical content words; a category of words to which new words are commonly added, such as nouns, verbs.

Optimality Theory
The hypothesis that a universal set of ranked phonological constraints exists, where the higher the constraint is ranked, the more influence it exerts on the language; e.g. in English, one constraint is the following: **obstruent** sequences may not differ with respect to their voice feature at the end of a word.

oral cavity
The mouth area through which air passes during the production of speech; see also **nasal cavity**.

oral sound
A non-nasal speech sound produced by raising the **velum** to close the nasal passage so that air can escape only through the mouth.

orthography
The conventional way of using characters in writing that relates to some structure of the linguistic system. English orthography uses an alphabetic writing system.

overgeneralisation
Children's treatment of irregular verbs and nouns as if they were regular, e.g. *bringed*. This shows that the regular rules have been acquired, but not the exceptions.
palatal sound
A sound produced by raising the front part of the tongue to the bony arch of the roof of the mouth.
paradox
A sentence to which it is impossible to ascribe a **truth value**.
parameter
One of a small set of alternatives for a particular phenomenon made available by **Universal Grammar**. Universal Grammar specifies, for example, that a phrase must have a **head** and possibly **complements**; a parameter states whether the complement(s) precede(s) or follow(s) the head.
paraphrase
A sentence with the same **truth conditions** as another, or the same meaning except possibly for minor differences in emphasis.
parsing
Process of analysing a sentence in spoken language or text into its constituents.
participle
The form of a verb that occurs after the **auxiliary verbs** (see Chapter 5) *be* and *have*.
particle
In Japanese, a morpheme that generally follows a noun and expresses grammatical functions such as topic, subject of sentence, object of sentence, location, etc.
passive sentence
A sentence in which the verbal complex contains a form of *to be* followed by a verb in its participle form. In a passive sentence, the direct object of a transitive verb in **d-structure** functions as the subject in **s-structure**.
performative sentence
A sentence containing a performative verb used to accomplish some act. Performative sentences are affirmative and declarative, and are in first person.
performative verb
A verb, certain usages of which comprise a **speech act**, e.g. *resign* in the sentence *I resign!* is interpreted as an act of resignation.
petroglyph
A drawing on rock made by prehistoric people.
pharyngeal sound
A sound produced by retracting the root of the tongue towards the back wall of the pharynx.
pharynx
The tube or cavity in the vocal tract above the **larynx** through which air passes during speech production.
phone
A particular realisation (pronunciation) of a phoneme, i.e. a sound segment.
phoneme
The abstract representation (in the mind of the speaker/listener) of a contrastive phonological unit in language; an abstraction from the range of variable phonetic realisations that occur in speech production, e.g. the *t* sounds in *stick* and *tick* are two different realisations (pronunciations) of the phoneme /t/.
phonemic principle
The principle that underlies alphabetic writing systems, in which one symbol typically represents one **phoneme**.
phonemic representation
The abstract (underlying) phonological representation of words and sentences.
phonetic property
A feature of a segment (e.g. voiced, nasal, alveolar) that distinguishes that segment from another.
phonetic representation
The surface representation of words and sentences; symbolic transcription of the pronunciation of words and sentences.
phonetic similarity
The sharing of most of the same phonetic features by a set of sounds.
phonetics
The scientific study of linguistic speech sounds, how they are physically produced (**articulatory phonetics**), how they are perceived (**auditory** or **perceptual phonetics**) and their acoustic characteristics (**acoustic phonetics**).
phonographic symbol
A symbol in a writing system that stands for the sounds of a word.
phonological feature
Phonetic property of a speech sound that defines the categories to which the sound belongs, e.g. *voice*, *continuant*.

phonological processes
Processes that apply to underlying representations to derive phonetic representations (pronunciation).
phonology
The sound system of a language; the component of a grammar that includes the inventory of sounds (phonemic units) and the processes required to ensure their appropriate combination and realisation, including aspects of rhythm, intonation and stress; the study of the sound systems of all languages.
phonotactics
Constraints governing the permissible sequences of **phonemes** and the possible location of phonemes in **syllables**, e.g. in English a word-initial nasal consonant may be followed only by a vowel; see also **possible word**, **nonsense word**, **accidental gap** (lexical gap).
phrasal category
The class of **syntactic categories** that comprises the highest-level categories, including NP, VP, AdjP, PP and AdvP. See also **lexical category** and **functional category**.
phrasal/sentential semantics
The subfield of semantics concerned with the meaning of syntactic units larger than the word.
phrase structure (PS) rule
Specifies the constituency of a **syntactic category**.
phrase structure (PS) trees
A tree diagram with syntactic categories that reveals the hierarchical structure of a sentence.
phrenology
A pseudoscience, the practice of which is determining personality traits and intellectual ability by examination of the bumps on the skull. Its contribution to **neurolinguistics** is that its methods were highly suggestive of the modular theory of brain structure.
pictogram
A form of writing in which the symbols resemble the objects represented; a non-arbitrary form of writing.
pidgin
A simple but rule-governed language developed for communication among speakers of mutually unintelligible languages, often based on one of those languages.
Pinyin
An **alphabetic writing** system for Mandarin Chinese using a Western-style alphabet to represent individual sounds.
pitch
How high or low the voice is perceived to be; the listener's perception of **fundamental frequency**.
place of articulation
The part of the vocal tract at which constriction occurs during the production of **consonants**.
polyglot
A person who speaks and understands several languages.
polysemous/polysemy
Describes a single word with several closely related but slightly different meanings.
polysynthetic language
Allows an inflected verb to function as an independent clause; typically encodes information about the subject, object, indirect object etc. on the verb to create a complex verbal word.
portmanteau morph
A portmanteau morph is a morpheme that is created by the fusion of two separate morphemes.
positron emission tomography (PET)
A technique to detect changes in brain activities and relate these changes to localised brain damage and cognitive tasks.
possible word
A string of sounds that obeys the phonotactic constraints of the *language* but has no meaning.
postalveolar
The region behind the **alveolar ridge**.
poverty of the stimulus
The argument that children know more about language than they could have learnt from their linguistic experience.
pragmatics
The study of how context and situation affect meaning.
predictable (non-contrastive) feature
A non-contrastive feature of a phone that is predictable by rule, e.g. aspiration in English voiceless stops or nasalisation in English vowels.
prefix
An **affix** that is attached to the beginning of a **morpheme** or **stem**.
preposition (P)
The **syntactic category** that can function as the head of a prepositional phrase.

prepositional phrase (PP)
The **syntactic category**, also **phrasal category**, comprising expressions that consist of a preposition plus a noun phrase.

prescriptive grammar
Rules of grammar brought about by grammarians' attempts to legislate what grammatical rules for speakers should be, rather than what they are.

prestige dialect
The dialect usually spoken by people in positions of power, and the one deemed correct by prescriptive grammarians; for example, RP (*r*eceived *p*ronunciation) (British) English, the dialect spoken by the British royal family.

presupposition
Implicit assumptions about the world required to make an utterance meaningful or appropriate.

principle of compositionality
A principle of semantic interpretation that states that the meaning of a word, phrase or sentence depends on the meaning of its components (**morphemes**, words, phrases) and on how they are combined structurally.

principles (constraints)
Restrict the application of a grammatical operation in a structure; also known as universal **constraints**.

productive
Refers to **morphological rules** that can be used freely and apply to all forms to create new words.

proper name
A word that refers to a person, place or other entity with a unique reference known to the speaker and listener; usually capitalised in writing.

prosodic bootstrapping
The learning of word or phrase segmentation by infants inferred from the stress pattern of a language.

prosodic/suprasegmental feature
Aspects of speech beyond the speech segment, including rhythm, stress and intonation patterns.

Proto-Germanic
The name given by linguists to the language that was an ancestor of English, German and other Germanic languages.

protolanguage
The first identifiable language from which genetically related languages developed.

psycholinguistics
The branch of linguistics concerned with **linguistic performance**, language acquisition, and speech production and comprehension.

radical language death
Disappearance of a language when all speakers of the language cease to speak the language.

rebus principle
In writing, the use of a **pictogram** for its phonetic value, e.g. using a picture of a bee to represent the verb *be* or the sound [b].

recursion
The property of human language that accounts for its infinite nature, permitting one sentence to be embedded under another ad infinitum.

recursive rules
A **phrase structure rule**, or series of phrase structure rules, that repeats the category on the left of the arrow on the right side of the arrow, hence permitting phrase structures of potentially unlimited length, corresponding to that aspect of speakers' **linguistic competence**.

redundant
Describes a non-contrastive, non-phonemic feature that is predictable from other feature values of the segment, e.g. [+voice] is redundant for any [+nasal] **phoneme** in English since all nasals are phonemically voiced in this language.

reduplication
A morphological process that repeats or copies all or part of a word to produce a new word.

reference
That part of the meaning of a noun phrase that associates it with some entity. That part of the meaning of a declarative sentence that associates it with a **truth value**, either true or false; see also **referent**, **sense**.

reference resolution
In computational pragmatics, the computer algorithms that determine when two expressions have the same referent; also the mental process determining the referent of a pronoun or other kind of deictic word or phrase.

referent
The entity designated by an expression.

reflexive pronoun
A pronoun ending with -*self* that generally requires a noun-phrase antecedent within the same S, e.g. *myself*, *herself*, *ourselves*, *itself*.

regional dialect
A **dialect** spoken in a specific geographical area; see **social dialect**.

register/level tones
A relatively stable (non-gliding) pitch on syllables of tone languages.

regular sound correspondence
The occurrence of different sounds in the same position of the same word in different languages or dialects, with this parallel holding for a significant number of words (e.g. /ɐː/ in Australian English corresponds to /æ/ in American English in words like *path* and *glass*); also found between newer and older forms of the same language.

relational opposites
A pair of **antonyms** in which one describes a relationship between two objects and the other describes the same relationship when the two objects are reversed, e.g. *parent/child, teacher/pupil*; *John is the parent of Susie* describes the same relationship as *Susie is the child of John*; see also **gradable pair**, **complementary pair**.

relative clause
A clause that modifies a noun, e.g. in *See the boy who is carrying an umbrella*, the relative clause restricts our focus to a particular boy, the one *who is carrying an umbrella*.

retroflex sound
A sound produced by curling the tip of the tongue back behind the **alveolar ridge**; commonly found in Australian Aboriginal languages.

rhyme
The **nucleus** + **coda** of a **syllable**, e.g. the /æt/ of /kæt/ *cat*.

root
The **morpheme** that remains when all **affixes** are stripped from a complex word.

rounded vowel
A vowel sound produced with rounded lips.

rules of syntax
Principles of **grammar** that account for the grammaticality of sentences, their hierarchical structure, their word order, whether there is structural ambiguity, etc.; see also **phrase structure rule, transformational rule**.

Sapir–Whorf hypothesis
The notion, associated in the English-speaking world with work by the American scholar Benjamin Whorf and programmatic statements by Edward Sapir, that the semantic structure of the language that a person speaks either determines or limits the ways in which they are able to form conceptions of the world in which they live.

savant
An individual who shows special abilities in one cognitive area while being deficient in others. Linguistic savants have extraordinary language abilities but are deficient in general intelligence.

second-language (L2) acquisition
The acquisition of another language or languages after first-language acquisition is underway or completed.

segment
An individual sound that occurs in a language; the act of dividing utterances into sounds, **morphemes**, words and phrases.

selection
Refers to the complement types that particular verbs or other lexical items can take.

semantic features (semantic properties)
Conceptual elements by which a person understands the meanings of words and sentences.

semantic priming
The effect whereby the speed of recognition of a word (e.g. *doctor*) increases after exposure to a semantically similar word (e.g. *nurse*) compared with exposure to a semantically more distant word. The word *nurse* primes the word *doctor*.

semantic rules
Principles for determining the meaning of larger units like sentences from the meaning of smaller units like noun phrases and verb phrases.

semantics
The study of the linguistic meaning of morphemes, words, phrases and sentences.

semivowels
The class of sounds, such as [j] and [w], that are articulatorily similar to vowels but function as consonants; see also **glides**.

sense
The inherent part of an expression's meaning that, together with context, determines its referent; also called intension.

sentence (S)
A **syntactic category** comprising expressions consisting minimally of a **noun phrase (NP)**, followed by an **auxiliary (Aux)**, followed by a **verb phrase (VP)**; the head of S is Aux.

separate systems hypothesis
The hypothesis that the bilingual child builds a distinct **lexicon** and **grammar** for each language being acquired.

shadowing task
Task in which participants repeat an experimenter's speech as rapidly as they can.

sibilant
A sound belonging to the class that includes **affricates**, **alveolar**, postalveolar **fricatives**, characterised acoustically by an abundance of high-intensity and high-frequencies perceived as 'hissing', e.g. /s/.

sign
A single gesture (possibly with complex meaning) in the sign languages used by the deaf.

sign language
A language used by deaf people in which linguistic units, such as morphemes and words as well as grammatical relations, are formed by manual and other body movements.

sisters
In a **phrase structure tree**, two categories that are directly under the same **node**.

situational context
Knowledge of who is speaking, who is listening, what objects are being discussed and general facts about the world we live in, used to aid in the interpretation of meaning.

slang
Words and phrases used in casual speech, often invented and spread by close-knit social or age groups, and fast-changing.

slip of the tongue (speech error)
An involuntary deviation from an intended utterance that often results in ungrammaticality, nonsense words, anomaly, etc.

social dialect
A **dialect** spoken by a particular social group; also referred to as sociolect.

societal bilingualism
The mutual abilities of a community to speak two (or more) languages with native or near-native proficiency.

sociolinguistic variable
A linguistic phenomenon such as double negation whose occurrence varies according to the social context of the speaker.

sonorant
A sound belonging to the class that includes vowels, approximants and nasals; non-obstruents.

sound shift
Historical phonological change.

sound symbolism
The notion that certain sound combinations occur in semantically similar words, for example, *gl* in *gleam*, *glisten*, *glitter*, which all relate to vision.

sound writing
A term sometimes used to mean a writing system in which one sound is represented by one letter. Sound writing systems do not employ the **phonemic principle** and are similar to phonetic transcriptions.

specific language impairment (SLI)
Difficulty in acquiring language faced by certain children with no other cognitive deficits.

spectrogram (voiceprints)
A visual representation of speech decomposed into component frequencies, with time on the *x* axis, frequency on the *y* axis and intensity portrayed on a greyscale – the darker, the more intense.

speech act
The action that a speaker accomplishes when using language in context, the meaning of which is inferred by hearers, e.g. *There is a bear behind you* may be intended as a warning in certain contexts, or may in other contexts merely be a statement of fact.

spelling pronunciation
Pronouncing a word as it is spelt, irrespective of its actual pronunciation by native speakers, e.g. pronouncing *Wednesday* as 'wed-ness-day'.

spell-out rules
Rules that convert abstract inflectional morphemes into pronounceable affixes in **s-structures**.

split brain
The result of an operation for epilepsy in which the **corpus callosum** is severed, thus separating the brain into its two hemispheres. Split-brain patients are studied to determine the role of each hemisphere in cognitive and language processing.

spoonerism
A speech error in which consonants, vowels or morphemes are switched between words.

s-selection
The classifying of verbs and other lexical items in terms of the semantic category of the **head** and **complements** that they accept.

s-structure
The phrase structure tree that is formed after any transformations have been completed.

standard dialect
The dialect (regional or social) considered the norm.

state/stative
A type of sentence that describes a state of being, such as *Mary likes oysters*, as opposed to describing an event, such as *Mary ate oysters*.

stem
The base to which one or more **affixes** are attached to create a more complex form that may be another stem or a word; see also **root**, **affix**.

stop
A sound in which the airflow is briefly but completely stopped in the oral cavity; falls under the class of **non-continuant** consonants.

stress/stressed syllable
A **syllable** with relatively greater length, more extreme values of pitch and/or (to a lesser extent) increased loudness than other surrounding syllables, and therefore perceived as prominent; also called **(prosodic) accent**.

structural ambiguity
The phenomenon in which the same sequence of words has two or more meanings based on different syntactic analyses.

structure dependence
A principle of Universal Grammar that ensures language learners can only hypothesise transformational rules based on hierarchical properties of phrase structure trees, and not on linear sequences of words.

style
A situational **dialect**, e.g. formal speech, casual speech; sometimes referred to as registers.

subject
The noun phrase in an S(sentence) that appears immediately below the S in a **phrase structure tree**.

substrate languages
The language(s) of the indigenous people in a language contact situation that contributes to the **lexicon** and **grammar** of a **pidgin** or **creole** but in a less obvious way than the **superstrate language**.

sudden language death
Disappearance of a language when all speakers of the language die or are killed in a short time period.

suffix
An **affix** that is attached to the end of a **morpheme** or **stem**.

superstrate language
The language that provides most of the lexical items of a **pidgin** or **creole**, typically the language of the socially or economically dominant group; also called lexifier language.

suppletive form
An inflected morpheme in which the regular rules do not apply.

surface dyslexia
A reading disorder in which the dyslexic person has difficulty reading words that have to be memorised because they are not pronounced in the way they are spelt.

syllabary
The symbols of a **syllabic writing** system.

syllabic
A phonetic feature of those sounds that may constitute the **nucleus** of **syllables**; all vowels are syllabic. In English, liquids and nasals may be phonetically but not phonemically syllabic in such words as *bottle*, *button*, *bottom*.

syllabic writing
A writing system in which each syllable in the language is represented by its own symbol, e.g. **hiragana** in Japanese.

syllable
A phonological unit composed of one or more speech sounds, one of which must be a vowel or vowel-like element in the phonetic output. Words are composed of one or more syllables.

synonym
A word with the same or nearly the same meaning as another.
synonymous
A meaning relation in which sentences have the same truth values in all situations; see also **paraphrase**.
syntactic bootstrapping
The learning of word meaning by understanding how the word works in the syntactic structure.
syntactic category
Traditionally called ‘parts of speech’; expressions of the same syntactic category can generally substitute for one another without loss of grammaticality.
syntax
The rules of sentence formation; the component of the mental grammar that represents speakers’ knowledge of the structure of phrases and sentences.
taboo
Refers to words or activities that are considered inappropriate for polite society.
tap
A sound in which the tongue quickly touches the roof of the mouth.
tautology (or analytic)
A sentence that is true in all situations; a sentence true from the meaning of its words alone.
teaching grammar
A set of language rules written to help speakers learn a foreign language or a different dialect of their own language.
telegraphic speech
Children’s utterances that may omit **grammatical morphemes** and/or **function words**.
tense/lax vowels
Features that divide vowels into two classes based on length; tense vowels are generally longer in duration than the corresponding lax vowels.
thematic role
The semantic relationship between the verb and the noun phrases of a sentence, such as agent, theme, location, instrument, goal, source.
theta assignment
The ascribing of thematic roles to the syntactic elements in a sentence.
tip-of-the-tongue (TOT) phenomenon
The difficulty encountered from time to time in retrieving a particular word or expression from the mental **lexicon**. Anomic aphasics suffer from an extreme form of this problem.
tone language
A language in which the tone or **pitch** on a **syllable** changes the meaning of the word, so that words with identical segments but different tones have different meanings.
top-down processing
Expectation-driven analysis of linguistic input that begins with the assumption that a large syntactic unit, such as a sentence, is present and then analyses it into successively smaller constituents (phrases, words, **morphemes** etc.), which are ultimately compared with the sensory or acoustic data to validate the analysis. If the analysis is not validated, the procedure returns to the previously validated point, and then resumes.
topicalisation
A transformation that moves a syntactic element to the front of a sentence.
trachea
The tube that runs from the top of the lungs to the larynx, often called the windpipe.
transcription – narrow phonetic
The detailed representation of speech sounds using phonetic symbols represented between square brackets [ ].
transfer of grammatical rules
The application of rules from one’s first language to a second language that one is attempting to acquire. The ‘accent’ that second-language learners have is a result of the transfer of first-language phonetic and phonological rules.
transitive verb
A verb that **c-selects** an obligatory noun phrase complement.
tree diagram
A graphical representation of the linear and hierarchical structure of a word, phrase or sentence.
trill
A sound in which a rapid vibration of the articulators occurs, e.g. the [r] in the Spanish *perro* is articulated by vibration of the tongue tip behind the alveolar ridge.

trochaic
Stress on the first **syllable** of a two-syllable word, e.g. *páper*.
truth condition
The circumstances that must be known to determine whether a sentence is true, and therefore part of the meaning, or **sense**, of declarative sentences.
truth-conditional semantics
A theory of meaning that takes the **semantic knowledge** of knowing when sentences are true and false as basic.
truth value
True or false; used to describe the truth of declarative sentences in context. The **reference** of a declarative sentence in **truth-conditional semantics**.
unaspirated
Phonetically **voiceless** stops in which the vocal folds begin vibrating very soon after release of the closure, e.g. [p] in *spot*.
unconditioned sound change
Historical phonological change that occurs in all phonetic contexts, e.g. the **Great Vowel Shift** of English, in which long vowels were modified wherever they occurred in a word.
ungrammatical
Describes a structure that fails to conform to the rules of grammar.
uninterpretable
Describes an utterance whose meaning cannot be determined because of nonsense words.
unitary system hypothesis
The hypothesis that a bilingual child initially constructs only one **lexicon** and one **grammar** for both (or all) languages being acquired.
Universal Grammar (UG)
The principles and properties that pertain to the grammars of all human languages.
unmarked
In a **gradable pair** of **antonyms**, the word that is used in questions of degree, e.g. *high* is the unmarked member of *high/low*.
uvular sound
A sound produced by raising the back of the tongue to the uvula, the fleshy appendage extending from the end of the velum (soft palate).
velar sound
A sound produced by raising the back of the tongue to the soft palate, or **velum**.
velum
The part of the roof of the mouth behind the hard palate that can be raised to separate the oral from the nasal cavity or lowered to allow air to flow into both the oral and nasal cavities; also called the soft palate.
verb (V)
The **syntactic category** of words that can be the head of a verb phrase. Semantically, verbs can denote actions, sensations and states. Two syntactic tests that identify verbs are the ability to combine with adverbs and with modals.
verb phrase (VP)
The **syntactic category**, also **phrasal category**, comprising expressions that contain a verb as the **head** along with its **complements**, such as noun phrases and prepositional phrases.
Verner's Law
The description of a conditioned phonological change in the sound system of certain **Indo-European** languages wherein **voiceless** fricatives were changed when the preceding vowel was unstressed; formulated by Karl Verner as an explanation for some of the exceptions to **Grimm's Law.**
vocal tract
The oral and nasal cavities, together with the **larynx** and the **pharynx**, all of which may be involved in the production of speech sounds.
voiced sound
A speech sound produced with vibrating vocal folds.
voiceless sound
A speech sound produced without vibration of the vocal folds.
voicing
The characteristic of a speech sound mainly determined by the presence or absence of vocal fold vibration; whether it is voiced or voiceless.
vowel
A voiced speech sound produced with minimal constriction in the vocal tract allowing air to flow unobstructed through the **oral cavity.** Vowel sounds form the centres of syllables.

well formed
Describes a grammatical sequence of words, one conforming to rules of syntax.

Wernicke's aphasia
The type of aphasia resulting from damage to Wernicke's area in which the patient often produces semantically incoherent language.

Wernicke's area
A back (posterior) part of the left hemisphere of the brain, which if damaged causes **Wernicke's aphasia**; also called Wernicke's region.

***wh*-parameter**
The parameter that gives language learners the binary option of moving *wh*-phrases to the highest hierarchical position in a structure or leaving them in an unmoved position in the sentence.

***wh*-phrase**
Can refer to a single *wh*-word or a more complex *wh*-phrase, such as *how many boys*, *whose hat* etc.

***wh*-questions**
Interrogative sentences beginning with one or more of the words *who(m)*, *what*, *where*, *when* and *how*, and their equivalents in languages that do not have *wh*-words.

word coinage
The construction and/or invention of new words that then become part of the lexicon.

word writing
A system of writing in which each character represents a word or **morpheme** of the language, e.g. Chinese; also called logographic writing.

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