# 4 The Evolution of Reasons

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How should we think about teleology and purpose in these post-Darwinian times?[1] Long ago, Karl Marx thought he knew what *On the Origin of Species* had accomplished:

> It is here that, for the first time, "teleology" in natural science is not only dealt a death blow but its rational meaning is empirically explained. (1861)

But a closer look shows that Marx is equivocating between two views that continue to be defended:

> We should banish all teleological formulations from the natural sciences,
> *or*
> now that we can "empirically explain" the "rational meaning" of natural phenomena without ancient ideology (of entelechies, Intelligent Creators and the like), we can replace old-fashioned, capital T "Teleology" with new, post-Darwinian teleology.

This equivocation is firmly knitted into the practice and declarations of many thoughtful scientists to this day. On the one hand, biologists routinely and ubiquitously refer to the *functions* of behaviors such as foraging and territory marking, organs such as eyes and swim bladders, subcellular "machinery" such as ribosomes, chemical cycles such as the Krebs cycle, macromolecules such as motor proteins and hemoglobin. But some thoughtful biologists and philosophers of biology insist that all this talk of function and purposes is really just a shorthand, a metaphorical façon de parler, and that, strictly speaking, there are no functions, no purposes, no teleology at all in the world. Among the epithets hurled at unrepentant teleologists are "Darwinian paranoia" (Richard Francis, Peter Godfrey-Smith) and "conspiracy theorists" (Alexander Rosenberg). It is, of course, open to defend an intermediate position that forbids certain teleological excesses but licenses more staid and circumscribed varieties. My informal sense is that many scientists assume that just such a sane middle position is in place and must have been adequately

defended in some book or article that they probably read years ago. So far as I know, however, no such consensus classic text exists and many of the scientists who guiltlessly allude to the functions of whatever they are studying still insist that they would never commit the sin of teleology.

One of the subtle forces in operation here is the desire not to give aid and comfort to the creationists and Intelligent Design crowd. By speaking of purpose and design in nature, we (apparently) give them half their case; it is better, they think, to maintain a stern embargo on such themes and insist that, *strictly speaking,* nothing in the biosphere is designed unless it is designed by human artificers. Nature's way of generating complex systems (organs, behaviors, etc.) is so unlike an artificer's way that we should not use the same language to describe them. Thus Richard Dawkins speaks (on occasion—e.g., Dawkins 1976, 4) of *designoid* features of organisms, and in *The Ancestor's Tale,* he says, "The illusion of design conjured by Darwinian natural selection is so breathtakingly powerful" (Dawkins 2004, 457). I recently overheard a conversation among some young people in a bar about the marvels of the nanomachinery discovered inside all cells. "When you see all those fantastic little robots working away, how can you possibly believe in evolution!" one exclaimed, and another nodded wisely. Somehow these folks had gotten the impression that evolutionary biologists thought that life wasn't all that complex, wasn't made of components that were all that wonderful. These evolution doubters were not rednecks; they were Harvard medical students! They hugely underestimated the power of natural selection because they had been told by evolutionary biologists, again and again, that there is no *actual* design in nature, only the *appearance* of design. This episode strongly suggested to me that "common knowledge" is beginning to incorporate the mistaken idea that evolutionary biologists are reluctant to "admit" or "acknowledge" all the obvious design in nature.

Consider in this regard Christoph Schönborn, Catholic archbishop of Vienna, the chap duped by the Intelligent Design folks. He said, notoriously, in a *New York Times* op-ed piece titled "Finding Design in Nature" (July 7, 2005),

> The Catholic Church, while leaving to science many details about the history of life on earth, proclaims that by the light of reason the human intellect can readily and clearly discern purpose and design in the natural world, including the world of living things. Evolution in the sense of common ancestry might be true, but evolution in the neo-Darwinian sense—an unguided, unplanned process of random variation and natural selection—is not. Any system of thought that denies or seeks to explain away the overwhelming evidence for design in biology is ideology, not science.

Which campaign do we evolutionists want to lead? Do we want to try to convince lay people that they don't really see the design that is stunningly

obvious at every scale in biology, or would we rather try to show that, wonderful to say, what Darwin has shown is that there can be design—real design, as real as it gets—without an Intelligent Designer? We have persuaded the world that atoms are not atomic and that the earth goes around the sun. Why shrink from the pedagogical task of showing that there can be design without a designer? So I am defending here (once again, with new emphasis) the following claim.

*The biosphere is utterly saturated with design, with purpose, with reasons*. What I call the design stance predicts and explains features throughout the living world using exactly the same assumptions that work so well when reverse-engineering artifacts are made by (somewhat) intelligent human designers. Evolution by natural selection is a set of processes that "find" and "track" reasons for things to be arranged one way rather than another. The chief difference between the reasons found by evolution and the reasons found by human designers is that the latter are typically (but not always) represented in the minds of the designers, whereas the reasons uncovered by natural selection are typically represented for the first time by those human investigators who succeed in reverse engineering nature's productions. That is to say, human designers think about the reasons for the features of their artifacts and hence have ideas that represent the reasons. They typically notice, appreciate, formulate, refine, and then convey, discuss, and criticize the reasons for their designs. Evolution doesn't do any of this; it just sifts mindlessly through the variation it generates, and the good stuff (which is good for reasons, reasons undreamed of or unrepresented by the process of natural selection) gets copied.

Evolutionary processes brought purposes and reasons into existence the same way they brought color vision (and hence colors) into existence: gradually. If we understand the way our human world of reasons grew out of a simpler world, we will see that purposes and reasons are as real as colors, as real as life. Thinkers who insist that Darwin has banished teleology should in all consistency add that he also demonstrated the unreality of colors. Atoms are all there is, and atoms aren't colored, and there are no reasons for the things they do, but that doesn't mean that there are no colors and no reasons. There are reasons for what proteins do, and there are reasons for what bacteria do, what trees do, what animals do, what we do. (And there are colors as well, of course.)

## 1. DIFFERENT SENSES OF *WHY*

Perhaps the best way of seeing this is to reflect on the different meanings of *why*. The English word is equivocal, and the main ambiguity is marked by a familiar pair of substitute phrases: *what for?* and *how come?*

> "Why are you handing me your camera?" asks *what* you are doing this *for*.

> "Why does ice float?" asks *how come*: what it is about the way ice forms that makes it lower density than liquid water.

The latter question asks for a *process narrative* that explains the phenomenon without saying it is *for* anything. It is often said that answers to the latter question cite the *cause,* not a *reason*—a proper, telic reason. "Why is the sky blue?" "Why is the sand on the beach sorted by size?" "Why did the ground just shake?" "Why does hail accompany thunderstorms?" "Why is this dry mud cracked in such a fashion?" but also "Why did this turbine blade fail?" Some folks might wish to treat the question of why ice floats as *demanding* a *what for, telic* reason—God's reason, presumably—for this feature of the inanimate world, but this is just a mistake born of the ambiguity in the word. We can see the mistake clearly in an exchange that occurred in a debate I had with an ardent champion of Skinnerian behaviorism, Lou Michaels, at Western Michigan University in 1974. I had presented my paper "Skinner Skinned" (published in *Brainstorms,* 1978) and Michaels, in his rebuttal, delivered a particularly bold bit of behaviorist ideology, to which I responded, "But why do you say that, Lou?" to which his instant reply was, "Because I have been reinforced for saying that in the past." I was demanding a *what for* reason and getting a process narrative in reply. There is a difference, and the Skinnerians' failed attempt to make it go away is one of the reasons—both *what for* and *how come*—behaviorism is no longer a dominant school of psychology. That fate should alert positivistically minded scientists that they pay a big price in understanding if they try to banish "what for."

Aristotle's four "causes," or *aitia,* mark a somewhat different set of questions. The "material cause" answers the question of what something is made of; since different things can be made of the same materials, the "formal cause" answers the question of what the difference is in such cases. The "efficient cause" answers the question of what triggered or started some event or process and is closest to how we use the word "cause" in most English usage (cause and effect), and then there is the *telic* or "final cause," which is indeed our *what for* sense of why: the purpose, the raison d'être, the reason for something to be or to be the way it is.

## 2. THE EVOLUTION OF REASONS: FROM *HOW COME* TO *WHAT FOR*

Evolution by natural selection starts with *how come* and arrives at *what for*. We start with a lifeless world in which there are lots of causes but no reasons, no purposes at all. There are just processes that happen. Some of those processes happen to generate other processes that happen to generate other processes until at some "point" (but don't look for a bright line) we

find it appropriate to describe the *reasons* why some things are arranged as they now are. We need to look at this transition in detail.

Following Wilfrid Sellars, Pittsburg philosophers, especially Robert Brandom and John Haugeland, have stressed that "the space of reasons," as we find it in the ubiquitous human practice of asking for and criticizing one another's reasons, is bound by *norms*. Wherever there are reasons, there is room for, and a need for, some kind of *justification* and the possibility of *correction*. They are right, but they tend to elide the distinction between two kinds of norms and their modes of correction, which I will call *Pittsburgh normativity* and *Consumer Reports normativity*. The former is concerned with the *social* norms that arise within the practice of communication and collaboration. Hence, Haugeland (1998) speaks of the "censoriousness" of members of society as the force that does the correcting. The latter, in contrast, is concerned with quality control or efficiency, the norms of engineering, you could say, as revealed by market forces or just by natural failures. This is nicely highlighted by the distinction between a good deed and a good tool, or, negatively, between *naughty* and *stupid*. People may punish you for being naughty, by their lights, but nature itself may mindlessly punish you for being stupid. Wherever there are *what for* reasons why, an implicit norm may be invoked: real reasons are supposed always to be good reasons, reasons that justify the feature in question. No demand for justification is implied by any *how come* question (beyond the ever-present but usually tacit demand expressed as "and how do you know?"). As we shall see, we need both kinds of norms to create the perspective from which *what for* reasons are *discernible* in nature. Reason appreciation did not coevolve with reasons the way color vision coevolved with color. Reason appreciation is a later, more advanced product of evolution than reasons.

In *Darwin's Dangerous Idea* (1995), I argued that natural selection is an algorithmic process, a collection of sorting algorithms that are themselves composed of generate-and-test algorithms that exploit randomness (pseudo-randomness, chaos) in the generation phase, and some sort of mindless quality-control testing phase, with the winners advancing in the tournament by having more offspring. But how does this cascade of generative processes get underway? That is, of course, a major puzzle in evolutionary theory: the origins of life are still shrouded in perplexity, but we can dissipate some of the fog by noting that, as usual, a variety of gradual processes of revision are available to get the ball rolling.

The prebiotic world was not utterly chaotic, a random confetti of atoms in motion. In particular, there were *cycles,* at many spatiotemporal scales: seasons, night and day, tides, the water cycle, and thousands of chemical cycles discoverable at the atomic and molecular level. Think of cycles as "do-loops" in algorithms, actions that return to a starting point after "accomplishing" something—for example, accumulating something, moving something, or sorting something—and then repeating (and repeating and repeating), gradually changing the conditions in the world and this *raising*

*the probability that something new will happen* (Dennett 2011). A striking abiotic example is shown in this photograph by Kessler and Werner:

This phenomenon looks "man-made" (e.g., it resembles sculptures by Andy Goldsworthy) but is the natural outcome of mindless cycles of freezing and thawing in the Arctic, creating feedback processes elegantly modeled by an algorithm presented by Kessler and Werner. There is a "how come" explanation of the Arctic formation but no "what for" explanation; it isn't for anything. Goldsworthy, in contrast, is an Intelligent Designer, who works out the reasons for his designs, usually in advance.

In the abiotic world, many similar cycles occur concurrently, a variety of parallel processing or mass production that turns eventually into mass

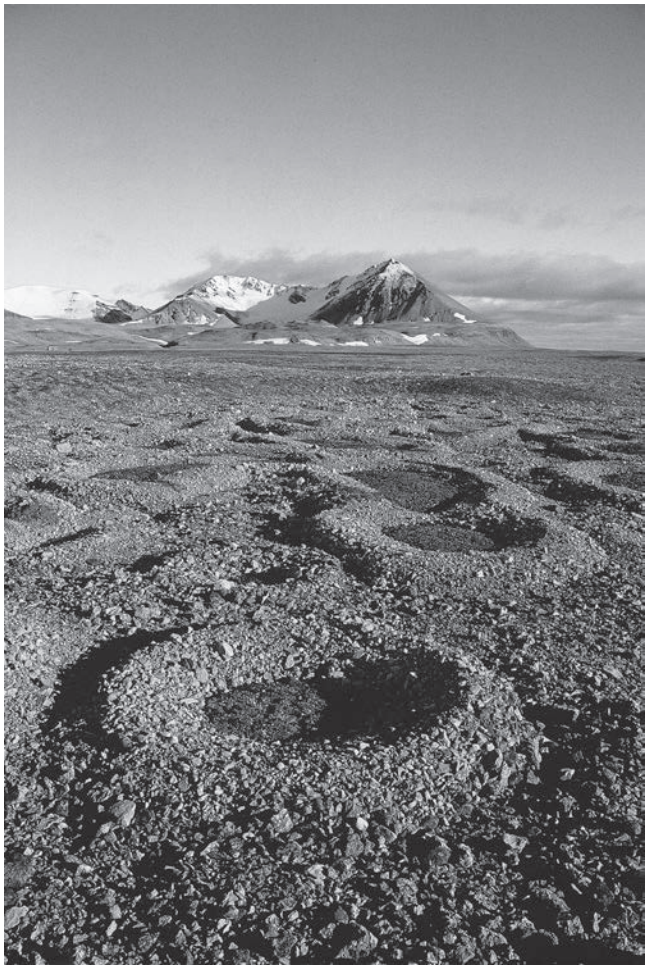

*Figure 4.1* Photograph of self-organized Arctic rock circles taken by Mark A. Kessler, A. Brad Murray, and Bernard Hallet.

*re*production. What begins as differential *persistence* gradually turns into differential *reproduction*. From this perspective, we can see that Darwinian algorithms always have winners and losers, differential "survival," and mere persistence gives things extra time to pick up revisions and adjustments. Biotic replication then is "just" a special case of differential persistence, a particularly explosive type that multiplies its advantage by . . . multiplication! It generates *tokens* of *types,* which can then "explore" slightly different corners of the world. "A diamond is forever" according to the advertising slogan, but that is an exaggeration. A diamond is magnificently persistent, much more persistent than its typical competition, but its persistence is well modeled by its linear descent through time, Tuesday's diamond being like its parent, Monday's diamond, and so forth. It never multiplies. But it can accumulate changes, wear and tear, a coating of mud that hardens, and so forth. It is affected by many cycles, many do-loops that involve it in one way or another. Usually these effects do not accumulate for long, but rather get wiped out by later effects, but sometimes a barrier happens to get erected: a membrane of sorts.

In the world of software, two well-recognized phenomena are *serendipity* and its opposite, *clobbering*. The former is the chance collision of two unrelated processes with a happy result, and clobbering is such a collision with a destructive result. Membranes that tend for whatever reason to prevent clobbering will be particularly persistent and will permit internal cycles (do-loops) to operate without interference. And so we see the engineering necessity of membranes to house the collection of chemical cycles—the Krebs cycle and *thousands* of others—that together permit life to emerge. (An excellent source on this algorithmic view of chemical cycles in cells is Dennis Bray's *Wetware,* 2009.) Even the simplest bacterial cells have a sort of nervous system composed of chemical networks of exquisite efficiency and elegance. But how could just the right combination of membranes and do-loops ever arise in the prebiotic world? "Not in a million years!" some say. Fair enough, but then how about once in a hundred million years? It only has to happen once to set off the multiplication.

Imagine we are back in the early days of this process where persistence is on the verge of turning into multiplication and we see a proliferation of some type of items where before there were none and we ask, "Why are we seeing these here?" The question is *becoming* equivocal. For now, there is both a process narrative answer, *how come,* and, for the first time, a justification, *what for*. We are confronting a situation in which some chemical structures are present while chemically possible alternatives are absent, and what we are looking at are things that are *better* at persisting/reproducing in the local circumstances than the alternatives. We are witnessing an "automatic" (algorithmic) paring away of the *nonfunctional,* crowded out by the functional. And by the time we get to a reproducing bacterium, there is functional virtuosity galore. In other words, there are *reasons why* the parts are shaped and ordered as they are. We can reverse engineer any reproducing

entity, determining its good and its bad, and saying *why* it is good or bad. This is the birth of reasons, and it is satisfying to note that this is a case of Darwinism about Darwinism: we see a proto-Darwinian algorithm morphing into a Darwinian algorithm, the gradual emergence of the species of reasons out of the species of mere causes, *what fors* out of *how comes,* with no "essential" dividing line between them. Just as there is no prime mammal—the first mammal that didn't have a mammal for a mother—there is no prime reason, the first feature of the biosphere that helped something exist because it made it better at existing than the "competition." (Glenn Adelson is the coiner of the valuable term "Darwinism about Darwinism," as quoted by Godfrey-Smith 2009.)

Natural selection is thus an automatic reason finder that "discovers," "endorses," and "focuses" reasons over many generations. The scare quotes are to remind us that natural selection doesn't have a mind, doesn't itself have reasons, but is nevertheless competent to perform this "task" of design refinement. This is competence without comprehension (Dennett 2009). Let's just be sure we know how to cash out the scare quotes. Consider a population with lots of variation in it. Some do well (at multiplying); most do not. In each case, we can ask *why,* and we ask it equivocally. In many cases, most cases, the answer is *no reason at all;* it's just dumb luck, good or bad. In which case we have only a *how come* answer to our question. But if there is a subset, perhaps very small, of cases in which there is an answer, a difference that happens to make a difference, then what those cases have in common provides the germ of a reason. The process narrative explains how it came about and also, in the process, points to why these are better than those, why they won the competition. "Let the best entity win!" is the slogan of the evolution tournament, and the winners, being better, wear the justification of their enhancements on their sleeves. This process accounts for the accumulation of function by a process that blindly tracks reasons, creating things that have purposes but don't need to know them. The need-to-know principle reigns in the biosphere, and natural selection itself doesn't need to know what it's doing. (See Dennett 2009 for more on this.)

So there were reasons before there were reason representers. The reasons tracked by evolution I have called "free-floating rationales" (1983, 1995, and elsewhere), a term that has apparently jangled the nerves of more than a few thinkers, who suspect I am conjuring up ghosts of some sort. Not at all. Free-floating rationales are no more ghostly or problematic than numbers or centers of gravity. There were nine planets before people invented ways of articulating arithmetic, and asteroids had centers of gravity before there were physicists to dream up the idea and calculate with it. I am not relenting; instead, I am hoping here to calm their fears and convince them that we should all be happy to speak of the reasons uncovered by evolution before they were ever expressed or represented by human investigators or any other minds. Consider the strikingly similar constructions in the following figures:

*Figure 4.2* Photograph of termite mound in Cape York by Fiona Stewart, North Queensland, Australia.

*Figure 4.3* Photograph of *Sagrada Familia* taken by Bernard Gagnon. Reprinted under the Creative Commons license. Source: http://en.wikipedia.org/wiki/File:Sagrada_Familia_01.jpg.

The termite castle and Gaudi's La Sagrada Familia are very similar in shape but utterly different in genesis and construction. *There are reasons* for the architectural structures and shapes of the termite castle, but they are not represented by any of the termites. There is no architect termite who planned the structure, nor do any individual termites have the slightest clue about how their individual contributions contribute to the whole; they have at most a myopic appreciation of the discriminations that trigger their behaviors. Competence without comprehension. There are also reasons for the structures and shapes of Gaudi's masterpiece, but they are (in the main) Gaudi's reasons. Gaudi *had* reasons for the shapes he ordered created; *there are* reasons for the shapes created by the termites, but the termites don't *have* those reasons. There are reasons why trees spread their branches, but they are not in any strong sense the trees' reasons. Sponges do things for reasons, bacteria do things for reasons, and even viruses do things for reasons. But they don't *have* the reasons; they don't need to have the reasons.

## 3. ARE *WE* THE ONLY REASON REPRESENTERS?

Do animals, aside from human beings, *have* reasons? That is a good question, and the answer is less obvious than common sense understanding of animals allows. Notice first that we human beings do lots of things for reasons that we have only recently been able to deduce: we sneeze, we cough, we shiver, we swing our arms when we walk, and so forth. There are good reasons for all these patterns in our behavior (and thousands of others) that benefit us without our needing to know why we engage in them. Might all nonhuman animal behavior be similar in this regard? Consider the ape: Is it more like Gaudi or the termite colony? The termite colony is resourceful, ingenious, evidence utilizing, activity modulating to a remarkable degree. But (I submit) termites individually have no reasons, and the collective agent they compose, although it does things for reasons, doesn't ever get to—or need to—represent those reasons to itself. So why should an ape need to do this?

Elizabeth Marshall Thomas imagines that dogs enjoy a wise understanding of their own ways: "For reasons known to dogs but not to us, many dog mothers won't mate with their sons" (1993, 76). Nonsense. There is no more reason to think dogs know the reason than that we know the reason why we yawn. There probably is a reason, but we don't know it yet, and it doesn't stop us from yawning. Probably she means something much milder and apparently defensible: she means that we don't know what the discriminated feature is that triggers dog mothers' reluctance to mate with their sons. Well, but we can find out by doing experiments. The first and simplest is to isolate a male puppy from its mother as soon as it is feasible, raise it elsewhere, and return it and see what happens. Will she recognize it? If so, the discriminated feature is very probably an odor.

*There is a reason* why that odor provokes that aversion, but dogs don't know that reason.

So we should start with the recognition that free-floating rationales can explain a lot of impressive animal behavior without endowing the animals with comprehension of those rationales. The fledgling cuckoo, when it pushes the rival eggs out of the nest in order to maximize the food it will get from its foster parents, does not need to understand its murderous project. When a low-nesting bird leads the predator away from her nestlings by doing a *distraction display,* she is making a convincing sham of a broken wing, creating the tempting illusion of an easy supper for the observing predator, but she need not understand this clever rationale. She *does* need to understand the conditions of likely success so that she can adjust her behavior to better fit the variations encountered, but she no more needs to be aware of the deeper rationale for her actions than does the cuckoo chick. The rationale of such deception is quite elaborate, and adopting Dawkins's (1976) useful expository tactic of inventing "soliloquies," we can imagine the bird's soliloquy:

> I'm a low-nesting bird, whose chicks are not protectable against a predator who discovers them. This approaching predator can be *expected* soon to discover them unless I distract it; it could be distracted by its *desire* to catch and eat me, but only if it *thought* there was a *reasonable* chance of its actually catching me (it's no dummy); it would contract just that *belief* if I *gave it evidence that* I couldn't fly anymore; I could do that by feigning a broken wing, etc.

Talk about sophistication! It is unlikely in the extreme that any feathered "deceiver" is an intentional system of this intelligence. A more realistic soliloquy for any bird would probably be more along the lines of, "Here comes a predator; all of a sudden I feel this tremendous urge to do that silly broken-wing dance. I wonder why?" (Yes, I know, it would be wildly romantic to suppose such a bird would be up to such a metalevel wondering about its sudden urge.) (The last two paragraphs are drawn from Dennett 1983, 350.)

This sort of account may do justice to much "clever" animal behavior, but it still leaves wide open the question of whether *all* animal cleverness is unaccompanied by reason representing. And as usual, the Darwinian refrain should be heard: look for a gradual path from mere "instinct" to rational action planning, with no "principled" dividing line. Ruth Millikan, noting the ubiquity and importance in animal cognitive systems of what she calls "pushmi-pullyu" representations, which are simultaneously declarative (informing) and imperative (action controlling), goes on to draw attention to a promising intermediate category: "animals that represent their goals in the same representational system in which they represent their facts" (2000, 170). This good proposal does not by itself create a sharp boundary, since

what is to count as a goal representation independent of a fact representation is itself a good place to look for further intermediate cases.

The "theory of mind" literature attempting to describe and account for animal perception and "understanding" of other animals is equally unlikely to yield crisp verdicts about this. Apes may well be what Nicholas Humphrey calls "natural psychologists," but they never get to compare notes with their colleagues or to argue over attributions. In Sellarsian, Pittsburghian terms, apes do not engage in the space of reasons, even if they are, in a weaker sense, reasonable creatures.

In what weaker sense? They, like many animals, are not just intentional systems, predictable by us from the intentional stance with its tacit rationality assumption; they themselves—some of them—can anticipate some of the reasonable behavior of other animals so that we do best to treat them as higher-order intentional systems. Do they *really* have beliefs about the beliefs and desires of other animals? There is no reason (yet) to attribute to them the capacity to *think about thinking* (Dennett 2000), but if we gloss their competence via intentional attributions, it often amounts to an appreciation of reasons why others do what they do. (There is, of course, much more that needs saying about the theory of mind controversies and about the role of evolved culture in making our minds so unlike ape minds, but I will leave those topics for other occasions. See, e.g., Dennett 1996 and 2009b.)

We language-endowed animals are the only ones who clearly have both the equipment and the proclivity for representing reasons to each other and, derivatively, to ourselves. We alone are "moved by reasons" in two senses: we respond appropriately, as all intelligent creatures do, to changes in the world that matter to us, but we also respond appropriately to the mere articulation of reasons in the Sellarsian game of reason giving and criticism. Reasons have become objects of attention in our manifest image in a way that is apparently unparalleled in any other species. It is one of our most valuable adaptations, but it is not an unmixed blessing. Representing reasons to each other and to ourselves proves to be a rich source of deception, of others and especially ourselves. Much of the activity in the space of reasons involves misleading feints and delusional justifications. These moves themselves are done for reasons, unconscious, evolutionarily endorsed reasons that we are only in recent years beginning to uncover systematically—though the world's great literature is replete with insightful examples of how we use words to misdirect. As Talleyrand once said, "Language was invented so that people could conceal their thoughts from each other."

## 4. READING REASONS BACK INTO NATURE

Our natural tendency to interpret *all* design as top-down, as representation-driven, is both anachronistic and anthropocentric. "In the beginning was the word . . ." according to the Bible, but this is simply mistaken. Words are a very recent invention, one of the most recent products of blind, purposeless

natural selection. But words *are* the beginning of Intelligent Design. Although there have been termite castle builders and bird's-nest builders and beaver dam builders for millions of years, architects and engineers have been with us for only a few thousand years.

If we look at Leonard Eisenberg's elegant diagram of the Tree of Life, we can see on the far right the most recent branchings among the mammals and we may choose one of the shortest-shown branchings as a good candidate for our divergence from our ape cousins about six million years ago:

(Do not make the mistake of seeing our branch as the last twig on the lower right—there is no sense in which we are the "last branch" on the Tree of Life, and in any case, there is no significance to the linear order of the branches on the diagram.) Then remember that words do not appear in our hominid branch for millions of years. So there has been hardly any time at all in the history of life on earth in which Intelligent Design has flourished.

But that does not mean that reasoning, with words, is an insignificant tool when it comes to probing the history of life. We, the reason representers, can now look back and discover the reasons everywhere in the Tree of Life. It took Darwin to figure out that a *mindless* process discovered all those reasons. We Intelligent Designers are among the effects, not the cause, of all those purposes.

We are the reason representers. In *Making It Explicit* (1998), Robert Brandom is remarkably inexplicit about *why* we represent reasons. We just do: we're people and that's what people do. This willingness to terminate curiosity prematurely has a long and distinguished tradition in philosophy, of course. Wittgenstein famously said that explanation has to stop somewhere, and that remark is often respectfully quoted by philosophers who choose not to delve into issues where science might have something to say about us. A famous example of this brand of philosophical neglect is P.F. Strawson on the reactive attitudes (in his classic paper "Freedom and Resentment," 1962). Why should resentment as a human emotion exist? It just does. *This will not do*. Human beings devote a lot of time and energy to their game of reason giving, and however stable and satisfying the view appears from inside the space of reasons, the existence of this elaborate set of human behaviors is just as much in need of a biological account as the distraction displays of the birds or the dam-building enterprises of the beavers. Sellars, unlike his more recent Pittsburgh followers, took this question seriously, and while he didn't—apparently—develop anything beyond a sketch of an evolutionary account of the origins of the practice of asking and giving reasons, he recognized the need for such an account and also pointed to the deep similarity between the law of effect (or Skinnerian operant conditioning) and evolution by natural selection (Sellars 1963, 325ff, 353).

Why do we represent reasons? My answer to the question, elaborated elsewhere at great length, is that our insuppressible and highly valuable proclivity for reading meaning and purpose into complex things, the intentional stance, is an "instinct" we share with all other mammals, birds, cephalopods for sure, and probably fish and reptiles. In other species, the

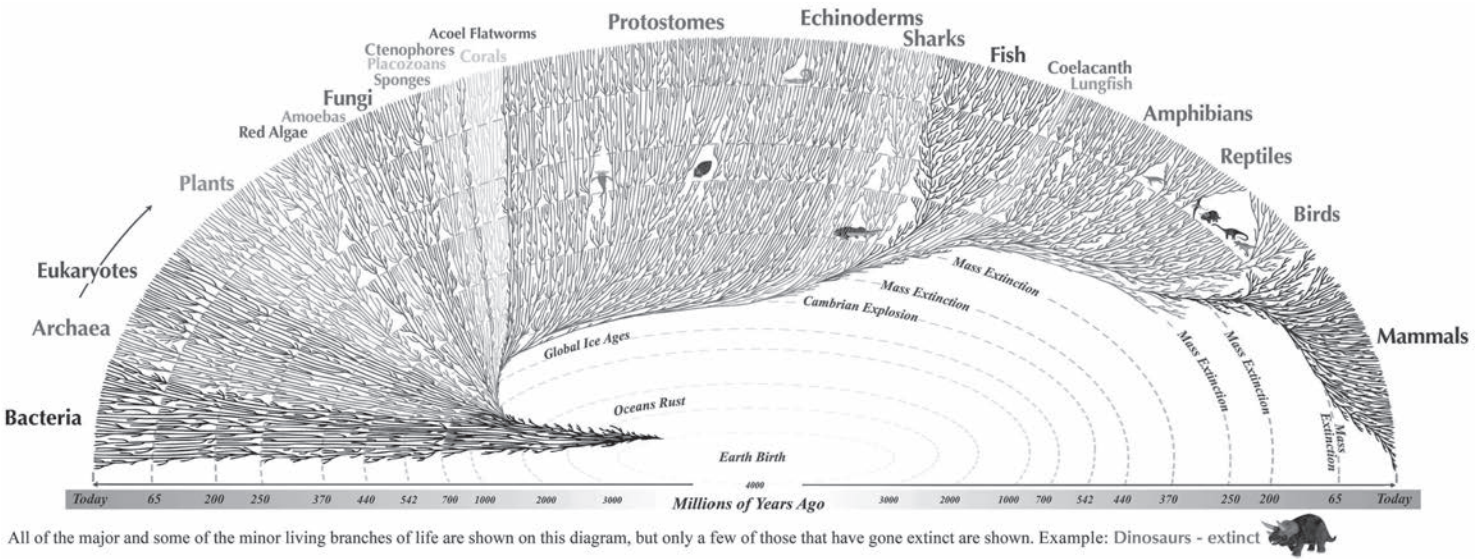


*Figure 4.4* *The Great Tree of Life*, Leonard Eisenberg. Ashland, Oregon, USA. Source: http://www.evogeneao.com.

individual mind readers do not have to realize they are reading minds; they just respond in a different mode to agent-like things, and the free-floating rationale for their having this urge is also shared by us. But in us, with our gift (or is it a curse?) of language, the words we use render "visible" and "audible" the purposes, reasons, beliefs, and desires, of ourselves and other agents; these become *objects to consider, to investigate, to evaluate*. And in the early days, we overshot, treating *all* complicated, interesting things from the intentional stance. Rivers wanted to return to the sea, rain gods might be bribed, the lodestone had a soul, and so forth. (And animals, of course, had minds like ours.) From today's Olympian perch—thanks to science in general and Darwin in particular—we can retrospect that this was an overextension, a good tactic used indiscriminately.

And, amusingly, when science discovered this error, it overcorrected in the opposite direction. Thou shalt not speak teleology! Thou shalt not endow any material things with minds! Sidney Morgenbesser nicely captured this excess in his challenge to Skinner: "Are you telling me it's wrong to anthropomorphize *people*?"

We can have our cake and eat it too. We can use the intentional stance to discover and articulate the reasons evolution (Mother Nature) has mindlessly unearthed—remember Crick's joke about Leslie Orgel's Second Rule that "evolution is cleverer than you are" (Dennett 1995, 74). We can use the intentional stance with a clear conscience, but only because Darwin has shown us how to cash out the intentional language in suitably austere talk about algorithmic processes of design generation and refinement. Darwin showed us how to get to *what for* from *how come*, and just as bacteria are still the majority life-form on the planet despite the proliferation of fancier, visible, multicellular life-forms with fancier reasons for what they do, every Darwinian *what for* explanation coexists with its obligatory *how come* backing. Often, however, biologists confidently—and justifiably, I claim—extrapolate from purely *what for* considerations to hypothetical process narratives for which there is currently precious little independent support. We don't yet know in detail *how come* bats fly, for instance, but we are in no doubt at all that this manifestly valuable function arose by some Darwinian process or other, which empirical research will surely pin down to some degree eventually. (We now use *what for* speculative hypotheses to help us frame testable *how come* hypotheses to test.) Some biologists are particularly leery of such adaptationist reasoning, but it is interesting to note that they almost always reserve their scruples for cases of adaptationist reasoning about politically sensitive topics—in particular, human evolution. We don't and can't have a highly detailed account of the environment of selection for many human traits that some evolutionists confidently explain, but we have much less detailed knowledge about the environment of selection of, say, whales from terrestrial mammals, and yet nobody complains when biologists sketch the likely sequence of transformations and use their sketches to guide their hunt for better accounts. If you understand intentional-stance

talk in the evolutionist's way, you *can* see the woods for the trees, which is a good thing, because you can't do biology without assuming function, and you can't assume function without seeing reasons everywhere.

Peter Godfrey-Smith may call this "Darwinian paranoia" and Alex Rosenberg may call it a "conspiracy theory." These are just the latest overreactions to the recognition that the intentional stance is a strategic tool of undeniable power, not a describer of unvarnished facts. Sometimes, they should realize, varnish is just what is called for, an indispensable Good Trick.

## NOTE

1. I am grateful for the comments of the participants at the wonderful Beirut conference, and further comments from Ruth Millikan, Bryce Heubner, and Arnon Lotem, which saved this essay from a variety of confusions and errors.

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# Contemporary Philosophical Naturalism and Its Implications

**Edited by Bana Bashour and Hans D. Muller**

Routledge
Taylor & Francis Group
NEW YORK AND LONDON

First published 2014
by Routledge
711 Third Avenue, New York, NY 10017

Simultaneously published in the UK
by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

*Routledge is an imprint of the Taylor & Francis Group,*
*an informa business*



*Library of Congress Cataloging-in-Publication Data*

Contemporary philosophical naturalism and its implications / edited by
Bana Bashour and Hans D. Muller. — 1 [edition].
pages cm. — (Routledge studies in the philosophy of science ; 13)
Includes bibliographical references and index.

1. Naturalism. I. Bashour, Bana, 1980– editor of compilation.
B828.2.C63 2013
146—dc23
2013017822

ISBN: 978-0-415-81309-9 (hbk)
ISBN: 978-0-203-06827-4 (ebk)

Typeset in Sabon
by Apex CoVantage, LLC