Jorge A. Colombo

Evolution and the Human-Animal Drive to Conflict

A Psychobiological Perspective

EVOLUTION AND THE HUMAN-ANIMAL DRIVE TO CONFLICT

Evolution and the Human-Animal Drive to Conflict examines how fundamental, universal animal drives, such as dominance/prevalence, survival, kinship, and "profit" (greed, advantage, whether of material or social nature), provide the basis for the *evolutionary trap* that promotes the unstable, conflictive, dominant-prone individual and group human behaviours.

Examining this behavioural tension, this book argues that while these innate features set up behaviours that lean towards aggression influenced by social inequalities, the means implemented to defuse them resort to emotional and intellectual strategies that sponsor fanaticism and often reproduce the very same behaviours they intend to defuse. In addressing these concerns, the book argues that we should enhance our resources to promote solidarity, accept cultural differences, deter expansionist and uncontrolled profit drives, and achieve collective access towards knowledge and progress in living conditions. This entails promoting the redistribution of resources and creative labour access and avoiding policies that generate a fragmented world with collective and individual development disparities that invite and encourage dominance behaviours. This resource redistribution asserts that it is necessary to reformulate the global set of human priorities towards increased access to better living conditions, cognitive enhancement, a more amiable interaction with the ecosystem and non-aggressive cultural differences, promote universal access to knowledge, and enhance creativity and cultural convivence. These behavioural changes entail partial derangement of our ancestral animal drives camouflaged under different cultural profiles until the species succeeds in replacing the dominance of basic animal drives with prosocial, collective ones. Though it entails a formidable task of confronting financial, military, and religious powers and cultural inertias – human history is also a challenging, continuous experience in these domains – for the sake of our own

self-identity and self-evaluation, we should reject any suggestion of not continuing embracing slowly constructing collective utopias channelled towards improving individual and collective freedom and creativeness.

This book will interest academics and students in social, cognitive, and evolutionary psychology, the neurosciences, palaeoanthropology, philosophy, and anthropology.

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With love,

to my wife, Beatriz
to the memory of my parents and my brother, Emilio
to my children and grandchildren

To the memory of my friends and mentors in the field of neurosciences,
Prof. Drs. Enrique T. Segura (Argentina), Charles Sawyer (US),
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FOREWORD

Animal species' survival in natural history is based on what can be taken and defended besides adaptive requirements imposed by the ecosystem. The former implies social and physical fitness, feeding and reproductive advantages, community standing, and social values and rules. Two ancestral behavioural drives in the macrobiotic natural kingdom inherited and excelled in the *Homo sapiens* – dominance and survival, in addition to gregariousness – and became engines of its social development and construction.

The ancestral behavioural dependence on fundamental, universal animal drives (dominance, survival) provides the basis for "*the evolutionary trap*" that promotes the unstable, "bipolar" (in evolutionary terms, e.g., chimpanzees vs bonobo's behavioural profiles) individual and group human behaviour. Intraspecies crime, tortures, and other aggressions are initiated and promoted by social marginalisation, social inequalities, dominance drives, and profit goals. Means to defuse these behaviours include emotional (religious) and intellectual (ideologies) strategies, which sponsor fanaticism and often lead to those behaviours meant to be defused.

Projected onto contemporary *Homo sapiens*, ancient, basic behavioural drives involve domains and drives shared with the animal kingdom. These are related to survival, dominance/prevalence, kinship, and "profit" (greed, advantage, whether of material or social nature). As stated earlier (Colombo 2022), three cognitive domains specifically excel in our human species: creativity, scientific method, and beliefs (ideological or religious). Would these allow us to reformulate ancient neural circuits involved with basic dominant/prevalence drives expressed as primaeval, evolutive persistent animal behavioural components? Its future as a species depends on whether creativity provides the needed ground for a constructive profile beyond the primal, ancient animal drive for dominance and prevalence that provides grounds for *the evolutionary trap*. As mentioned

earlier (Colombo 2021a) and will be reviewed here, this bipolar nature distorts the global perspective of our collective future and ecological conditions.

Imprinted in our ancient origin is our basic biological construction shared with other mammalian species. Our human history is an account of *a Janus-faced*[1] species – in the sense of a bivalent behavioural drive perhaps linked to evolutionary constraints of *Hominoidea* descendants – capable of arising into sociopathic and the most atrocious and destructive behaviours and yet capable of surprising creativeness and construction of knowledge and beauty, values that keep feeding the astonishing human adventure. Should we then consider the coexistence of two *Homo sapiens* varieties or subspecies? If so, in due time, which will prevail or territorially diverge?

The human species is composed of continuously evolving neurobehavioural identities interactive with the physical environment, social environment, and introspective behaviour. Hence, under normal conditions, new socio-cultural components interacting with ancient neural circuits tend to mould ancient animal drives (survival, dominance, territoriality, feeding, reproduction, gregariousness). However, the species have not reached the dispensing stage of the latter, inasmuch as they provide the basic behavioural scaffolding on which socio-cultural interaction operates. This ancient behavioural dependence provides the basis for *the evolutionary trap* that generates the unstable, *bipolar* individual and social behaviour, often yielding to sociopathic tendencies that feed wars, oppression, crime, torture, and other means unrelated to the demands of natural survival but moved by dominance and profit. This is a warped profile of animal behaviour. It is a means to attempt to defuse these behaviours, resorting to emotional (religious) and intellectual (ideologies) strategies, which have sponsored fanatic standings leading to those same behaviours that were meant to be defused. The opposing behavioural profile provides solidarity, caring, and creativity and often appears expressed at the individual or group level yet is frequently suffocated or dimmed by the dominance of the sombre profile described previously.

What does it take to tune the human cord of our *Homo sapiens* species to vibrate so intensely as to cancel the horrors it can construct, regardless of ideological, political, religious, racial, or corporative standing?

Perhaps the following concept provides grounds to start understanding the previous question,

> … let's say to be brief, a subject determined by the structure of the system.
> *(Eduardo Colombo 2012, personal communication)*

Beyond our creativeness and acts of solidarity expressed under specified circumstances, our species' origin has an aeons-long animal inheritance in which basic survival and dominance behaviours are the scaffolding moulded under harsh, changing environmental conditions and prey-predatory interactions. Our species must overcome this formidable backpack to allow our most cherished human values (solidarity, equal rights, creativity) to emerge and fully predominate.

In modern terms, *the evolutionary trap* has exchanged physical dominance for a cognitive gap and military dominance, and excessive wealth accumulation has transformed into social power, media dominance, and political construction – a sort of privileged financial cast system. It is a web that pretends to keep moulding and building our collective present and future towards the most profitable goals.

It is known that the individual and collective cognitive and behavioural profiles result from an interaction with socio-environmental conditions. Hence, cultural and sociopolitical *enclosures* severely mould/affect the formers' identity profile construction and expression. Depending on the entropy/tension generated in such interaction with personality profiles and historical experiences, we grow and construct our identities and their expression conditioned by the said enclosures.

This brief account underscores the pressing, merging question, *Quo vadis Homo sapiens*? The socio-cultural mosaic representing our historical and current civilisation that evolved since *Homo sapiens* tribes abandoned hunter-gatherer activities and settled as a farming society reflects a complex combination of factors involved in social group establishment and interactions. Hence, their collective profiles and desires anticipate non-uniform living goals, values, and strategies. Yet, basal drives of survival, reproduction, and dominance profiles permeate such socio-cultural mosaic, though resolved non-uniformly, thus generating complex interactions. From a neurobiological perspective, interacting and transforming information requires a process that implies common signature codes and a receptive *neuro-cognitive net* based on an interactive historical background (construction of cultural profiles), as stated in Colombo (2014) in *Épigenèse de l'homme social.*

This generates social interactions resulting in a history of latent or manifest violence expressed as military conquest, cultural replacement or hybridisation, slavery, and increased social entropy in a multicultural context. These socio-cultural differences – undergoing dynamic interactive development – represent another basic component of our *evolutionary trap.* It is expressed as inequalities represented by the fact that the wealthiest 10% of the global population currently takes in 52% of the global income, whereas the poorest half of the population earns 8.5%, as stated in the World Inequality Report (Chancel et al. 2022). In this regard, global wealth inequalities are even more pronounced than income inequalities. The poorest half of the global population barely owns any wealth, possessing just 2% of the total. In contrast, the wealthiest 10% owns 76% of the global wealth.

Current asymmetrical worldwide living conditions generate developmental socio-cultural and cognitive gaps that distort social interactions. They build a scaffolding that conditions future human development. This is manifested in the desire for dominance based on autocracy, violence, and wealth inequality, based on the ability and power to impose policies that condition the culture of nations and into accepting privilege or inequity in the distribution of wealth and educational opportunities. These social profiles condemn vast population sectors to material or cognitive pauperism and marginalisation, a by-product of current,

predominant social constructions. Within this domain, cognitive lag among human communities, poverty, and a lack of access to cognitive enhancement marginalise communities from enriching individual and collective processes, setting up a matrix of unfavourable individual and collective developmental conditions. Human priorities should enhance our resources to promote solidarity and achieve collective access to knowledge and progress in living conditions.

As metaphorically stated in Colombo (2015), as a species, we have managed to break the mirror where we gazed, wondering what could be on the other side. We now see what is on the other side: atoms, galaxies, quasars, protons, neutrons, quarks, and much more. We have created beauty and learned to appreciate it. All this has been within reach of the privileged. However, shattering the mirror shows a darker side of human nature. We have submerged hundreds of thousands of human beings into a darker dimension, condemned them to hunger, misery, and social exclusion, and blocked their access to learning while enjoying human conquests. Worse, according to canons of our century, we deprive them of a quality of life and have placed the viability of species, including ours, at an alarmingly low survival rate.

In short, our future faces three sombre menaces from our species' *evolutionary trap*: the environmental climate demise due to the relentless profit-seeking, the societal and culturally damaging wars based on dominance drives, and delays in providing equal opportunities for cognitive/educational development.

*

As stated by Neuberg et al. (2010), humans are animals; as such, human brains, like all animals, evolved via natural selection to solve recurring fitness-related problems that our ancestors faced long ago. Perhaps more importantly, people are social animals. According to the authors, the problems faced by our ancestors not only included those faced by all animals (e.g., resource acquisition, survival, mating) but also those specific to social life (e.g., affiliation and coalition maintenance, status-seeking, intergroup conflict).

Our *Homo sapiens*' closest living species among living primates are the chimpanzees (*Pan troglodytes*) (Figure 1) and bonobos (*Pan paniscus*).

> The last common ancestor can be reconstructed to have had a brain of approximately 300–400 g that displayed several unique phylogenetic specialisations of development, anatomical organisation, and biochemical function. These neuroanatomical substrates contributed to the enhancement of behavioural flexibility and social cognition. With this evolutionary history as precursor, the modern human mind may be conceived as a mosaic of traits inherited from a common ancestry with our close relatives, along with the addition of evolutionary specialisations within particular domains. These modern human-specific cognitive and linguistic adaptations appear to be correlated with enlargement of the neocortex

FIGURE 1 *Pan troglodytes* (Image Credit: CC0 Public Domain via Phys.org (https://phys.org/news/2017-09-chimpanzees-tools.html).

> and related structures. Accompanying this general neocortical expansion, certain higher-order unimodal and multimodal cortical areas have grown disproportionately relative to primary cortical areas.
>
> *(Sherwood et al. 2008)*

On evolutive terms, human lineage has been agreed to have diverged from a common ancestor with chimpanzees and bonobos between 5 and 7 million years ago. Hence, as a Nature editorial (2016) put it, were humans able to discover the remains of all our ancestors, the world would be a giant cemetery. Complex human behaviours reflect ancient mammalian neural systems that evolved to solve critical problems in adaptive ways, with far-reaching consequences for even our most venerated human traits, as stated by Preston (2013).

As mentioned earlier (Colombo 2019), the history of our evolution over the last 10,000 years has been primarily about our cultural development, adaptations to social contexts, and new, natural, and artificial environments. Various beliefs on unverifiable grounds tend to prevent our species from becoming *natural history*. However, as Hermann (2017) lucidly states, while we may recognise our importance as individuals to humankind, to ourselves, and to those we love and care about, our presence and status on Earth is biologically nothing more than a stage of evolution.

*

Our species has been considered to have a bipolar behavioural profile (Boehm 2012a) based on genetic lineages from *ancestral Hominoidea* heritage. Its expression

depends on the cultural environment and values developed for itself. Social, behavioural trends, or social phenotypes, are continuously modelled by bio-social interactions acting over the basic, deeply entrenched survival and prevalent drives. The latter conforms to the basic structure of the *hidden nature* that builds our *evolutionary trap.* This condition was characterised as "the most bipolar ape" by De Waal (2005) in terms of our profile compared to the conflictive physical drives of chimpanzees and the sociability of bonobos. Thus, should we unfold their biology entirely, it would highlight our common genetic and cultural evolutionary origins, as mentioned by Roffman and Nevo (2010).

Since the dawn of time, animals living in gregarious groups have expressed a hierarchical organisation based on unequal rights for feeding and reproduction, which usually affect survival and power-access interactions. Even isolated animals seeking territorial or reproductive rights decide these based on competing instances. A rise in social status or seeking special rights implies some form of competition. This competing *backpack* has species-specific and environmental conditions. As drivers of social attachment, Panksepp (1998) (cf. Decety et al. 2012) provided evidence that the social attachment system is built based on more primitive regulation systems such as those involved in place attachment, thermoregulation, and physical pain.

*

The individual construction is based on two interactive vectors, the genetic and the ecological (social and environmental), interacting in a purposive organism. The evolution of the *Homo* species progressively added new components to this competition based on abstract and material values, cognitive development, Machiavellian behaviour, and institutionalised social hierarchies. Among non-human animals' physical qualities define the probabilities of leadership and social rights. Adapted to a profit-driven system, humans incorporated a new prevailing social value, i.e., *wealth and associated power.* The resulting social stratification based on property, wealth, and labour force added unequal opportunities to essential human development factors – education, health, and labour/social mobility based on access to cognition and information. This contributed to constructing a significant social gap in perspectives regarding individual development, community integration, and access to social hierarchies.

Greed can not only be considered a sociopathic behavioural component among humans, but a distorted behaviour anchored in ancient animal drives (accumulation of resources, elimination of genetic competitors in gregarious communities, competition for hunting grounds, and reproductive or hierarchical prevalence) that used to have survival and adaptive value. Hence, human nature operating in a "free-running competition mode" fed by greed and unchecked profit represents a high risk for itself and its ecological universe. Thus, besides physical qualities that decide leadership among gregarious animals, humans have added cognition, talent, a system promoted by greed based on profit (instead of

ancient feeding and reproductive access), and shared propositional behaviours. These profiles involve psychobiological factors, an early developmental environment, access to education, and social mobility. The sociopolitical conundrum is whether such processes must lead towards a generation of social classes. The latter allows the construction of differential wealth, political power, social staging, and progressively degrading environmental and ecological domains, which lead to perfecting *the evolutionary trap* for our species. Placed on social terms,

> If we abandon the utopian dimension of change, we will continue to repeat in an uncritical way all the perversions of the system.
>
> *(Eduardo Colombo 2013)*[2]

Within the above considerations, the emerging condition of poverty tends to standardise communities and recreate a proper set of values and norms, either by forcing them to function in pursuit of essential or primary survival goals or by subjecting them to a spectrum of biomedical risks and cultural hollowing out or generating its proper social, ethical culture. In short, it marginalises them from enriching individual and collective processes, setting up a matrix of unfavourable conditions for developing the brain and mental potential. Therefore, poverty is detrimental to the individual, the community, and the species, the latter depriving it of potential sources of biological and cultural variability.

Besides cultural and ethnic social profiles, the above considerations lead to viewing current fractured global conditions as an unwanted road leading to an increasingly disjointed human society immersed in a misshapen environmental interaction. It could be stated (Colombo 2019) that human evolution did not erase our ancestral neurobiological inertias. Instead, it generated a sort of "*conceptual schizothymic construction*" where the "ancient animal ghosts" of dominance, territoriality, reproductive rights, feeding rights, anger, cruelty, and power-seeking merge whenever we abandon the disguise of our "new" human superstructural, cultural dimension, fed by creativity and knowledge-seeking drives.

This bleak perspective for our species poses at least two possible outcomes; either a change in current human values linked to profit and corporative dominance will cause our species to undergo slow diversion into marginal subcultures, or a slow replacement by other *Homo* variants will occur, as it happened several times in the timeline of the *Homo* species. These variants could be earthbound or extraterrestrial bound, for the world spends an unimaginable amount of dollars killing natural life and ecosystems on this planet and billions of dollars exploring outer space.

Although seeking knowledge on other planets expands knowledge in several domains, in allotting financial resources, consideration should be given to the present unequal living conditions, environmental abuses and degradation, and the biological and climate consequences on planet Earth.

Even though cultural interaction is inevitable, the possible changes should not originate from an imposed action but as a product of natural, dynamic interaction.

This entails a continuous process of cultural reformulation/replacement, an interactive process of a cognitive nature and not one based on power imposition, staging conditions for warfare. On metaphorical grounds, our *Homo sapiens* world is polychromatic with continuously changing intensities, so let us try to keep it as interesting and creative as that implies.

The prevalence of dominance drives over moral and social constructive values is blatantly shown during Hitler's ascent in Nazi Germany and other regimes. As stated by Muchnik (2000), it was the perversion of doing business regardless of the ends, plus the affinities in political thought that motorised businesspeople and bankers from American and European countries who contributed to financing Hitler, his party, and Germany's European conquest. According to Muchnik (2000), far from fleeing, foreign capital expanded the establishment under Nazism.

The following pages attempt to build an argument along these lines of thought and alert us to the increasing gap in living conditions and the destructive side of our species that builds our *evolutionary trap.* This is a precondition – and implicitly suggesting – for the need to reconsider our current drives[3] and seek alternative potential horizons. It implies a *tug-of-war* between inherited, genetic, and dynamic cultural forces that have developed through millennia. For, as Kelley (2005) inquires,

> Did the same constellation of causal factors that gave rise to the chimpanzee pattern of coalitionary killing of neighbors produce a parallel (and convergent) outcome among Paleolithic *hominins*?

As commented by Smith (2007), humans are capable of almost unimaginable violence and cruelty towards one another (see later), a profile that, as stated by the author, this dogged aggressiveness is grounded in our genes. However, we are also particularly sociable and cooperative. In fact, like all living things, *Homo sapiens* possess an ancient heritage that has honed and sculpted our minds with a significant impact on how we live our lives today.

In addition, as stated in Colombo (2010, 2021a), fundamentalist beliefs, a disregard for environmental abuse, belligerence to resolve discrepancies, personal and group-centred greed, growing inequalities and disinformation played by dominant carriers, and intolerance of the dissension describe an immature condition on the behaviour of our species. If not just an evolutive stage, then we, in fact, belong to the "wrong species" on a path towards demise.

If not leading to our demise, current human development is setting up a path towards generating divergent subspecies and an increasing unrestrained gap among human communities' fundamental values and social and developmental profiles. This comment places human shared values over one of our most cherished profiles, i.e., our ancestral drive towards knowledge. This ought to include collective human well-being as a priority in our thirst for knowledge and the goal of financial resources. Thus, it seems it is time to reformulate our global priorities

towards improved access to progress in living conditions and knowledge and to potentiate individual know-how and creativity. It would thus enhance the source and distribution of shared progress and promote true globalisation instead of a fractured world community with abysmal differences well beyond those affected by biological and cultural domains.

As stated earlier (Colombo 2010), in a period of approximately 6–10 thousand years, we have passed from farmers and artisans to introducing ourselves to the knowledge of the atom, the universe, the origin of species, and the molecular structure of biological beings. We have delved into human and animal behaviour knowledge to produce objects of extraordinary beauty and build imaginaries of the most varied nature. We have also been capable of destroying all of this or threatening to do so, of generating inhuman living conditions for fellow human beings, condemning them to early, massive, or cruel deaths, and developing a well of unfathomable depth where we shelter our greed, pride, selfishness, and vanity.

We place the reader in a position of a critical, committed observer of our species' actions from a perspective based on the complex and subtle characteristics of a brain-mind coupling that allows maximising social skills, analysis, and creativity on a planet that is home to so many diverse cultures and beliefs. From that point of observation, we enter the present horizon, configured by the product of our actions on a global level. The possible result suggests a bitter and conflictive conclusion, which opposes the avatars and aeons that passed until the emerging opportunity of *Homo sapiens* and the development of a delicate, complex, and plastic organ of thought – expressed in the arts, sciences, and solidarity. Additionally, it expresses a persistent and dangerous transit along the path plagued by sectarian or socially exclusive, hostile, and destructive behaviours, directed either towards their peers or the environment, nourished by two ancestral tendencies in evolution, i.e., gain (profit) and dominance. Are we not facing elitist supremacy in a polychrome-rich global society where the 1% designs our collective future?

Finally, as Noam Chomsky (2015) warns about the responsibility of the elite class and summarises the building threat pending on our civilisation,

> All of them are trapped by an institutional logic that is deeply pathological, and that must be cured (and quickly) if we are not to put an end to the human race.

Though we cannot resign to our biological nature and evolutive history, let us believe and act upon what is within human mental power and decision-making to bend the ancestral behavioural drives that tend to corrupt our social constructions and diminish human cultural variety and interactions, a potential source of continuous adaptive improvements and enrichment.

***

Notes

1 Implying a two-sided behaviour.
2 https://estudioslibertarios.wordpress.com/2013/04/11/entrevista-eduardo-colombo-2013/
3 https://dictionary.apa.org/drive. *n.***1.** a generalized state of readiness precipitating or motivating an activity or course of action. **2.** in the classical psychoanalytic theory of Sigmund Freud, a concept used to understand the relationship between the psyche and the soma (mind and body); drive is conceived as having a somatic source but creating a psychic effect. Freud identified two separate drives as emerging from somatic sources: libido and aggression.

1

SPECIES AND CULTURAL EVOLUTION

A Brief Account of Our Distant and Complex Evolutive Origin

The conundrum posed by the events leading to our species' emergence of its behavioural complexity and evolution would have probably occurred in multiple genetic steps that must have left detectable footprints in our genomes, as posed by Gagneux and Varki (2001). Varki and Altheide (2005) stated that the difference between human and chimpanzee genomes would vary by approximately 4%. According to Patterson et al. (2006), the genetic divergence time between humans and chimpanzees would significantly vary across the genome, conveying important information about the timing and process of speciation since both lineages could have exchanged genes before separating permanently. In this domain, what is not known is the extent to which the ancestral population that gave rise to *anatomically modern humans* was genetically isolated and whether archaic *hominins* made a genetic contribution to the modern human gene pool, as proposed by Hammer et al. (2011). In other words, as stated by the authors, would our genes descend from divergent ancestors occupying different ecological niches over a wider geographical range across and outside the African Pleistocene landscape? These authors further state that polymorphisms present in extant populations are introgressed via relatively recent interbreeding with hominin forms that diverged from the ancestors of modern humans in the Lower-Middle Pleistocene.

According to a review by Chen et al. (2020), studies of ancient DNA are transforming our understanding of human evolutionary history and, in particular, how admixture has shaped past and present patterns of human genomic variation, particularly in relation to the discovery that genetic admixture with archaic *hominins* occurred multiple times throughout human history. How would this ancestral binding impinge upon our modern species' neurobehavioural variants?

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Furthermore, as mentioned by Herrmann and Tomasello (2012), humans would not have developed entirely new forms of cognition but probably taken the great ape version of cognition and "collectivised" it through their skills and motivations of shared intentionality. Or, as placed by van Schaik (2016), biologically speaking, we would be apes that are part of mammalian radiation (primates), or, as most definitely stated,

Humans are African Great Apes.

As mentioned in a *Nature* editorial (2016), the human lineage would be more diverse than was ever imagined.

*

According to Gintis et al. (2015), around 2.5 million years ago, there was a major divergence in the evolutionary path of our possible ancestors. The Australopithecines branched in at least two very different evolutionary directions. One led to the robust Australopithecines that underwent a genetic dead end about 1.4 million years ago. The other likely led to the first *hominins*, probably due to climate changes and feeding habits.

Our species' origin would represent a genomic kaleidoscopic genomic admixture rather than a unilinear heritage; the hypothetical evolutive chain leading to our species may vary and recognise different routes and possible genetic exchanges, as mentioned earlier and proposed by Kuhlwilm et al. (2016). As recently stated by Chen et al. (2020), progress in the collection and understanding of ancient DNA is progressively transforming our views on the evolution of our species, particularly how an admixture with contemporary, archaic *hominins* through time has shaped the genomic construction of modern humans.

The basis of our nature did emerge from an endless series of previous evolutionary events, which arose from adaptability and genetic potential under changing and often violent geo-climatic conditions. As mentioned before, anthropoids and related species of the *Homo* lineage that gave rise to *anatomically modern humans* probably had a chance for genetic exchange before speciation. In this ancestral trail from which *Homo sapiens* emerged, genetic certainties combined with *ghostly* remains and different environmental conditions resulted in various human phenotypes. This statement does not limit itself to somatic events but includes individual and collective behavioural and neurocognitive profiles and drives. From this species-ecological interaction emerged numerous *Homo* species now extinct, with different characteristics and adaptive capacities to different ecological niches that possibly underwent genetic exchanges among proximate *Homo* variants.

Humans (*Homo sapiens*) are a member of the great ape clade, along with chimpanzees (*Pan troglodytes*) and bonobos (*Pan paniscus*), and evolutionary close to gorillas (*Gorilla gorilla*) and orangutans (*Pongo*). Figures 2 and 3 summarise and illustrate these complex and extended events across time.

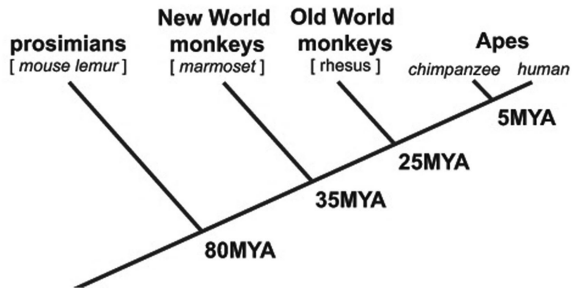

FIGURE 2 Phylogenetic tree of primates. Cladogram showing the evolutionary divergence between humans and each of the main primate taxonomic groups with estimated time points of divergence (MYA, millions of years ago). Adapted with permission from Miller et al. (2016); Belin et al. (2018).

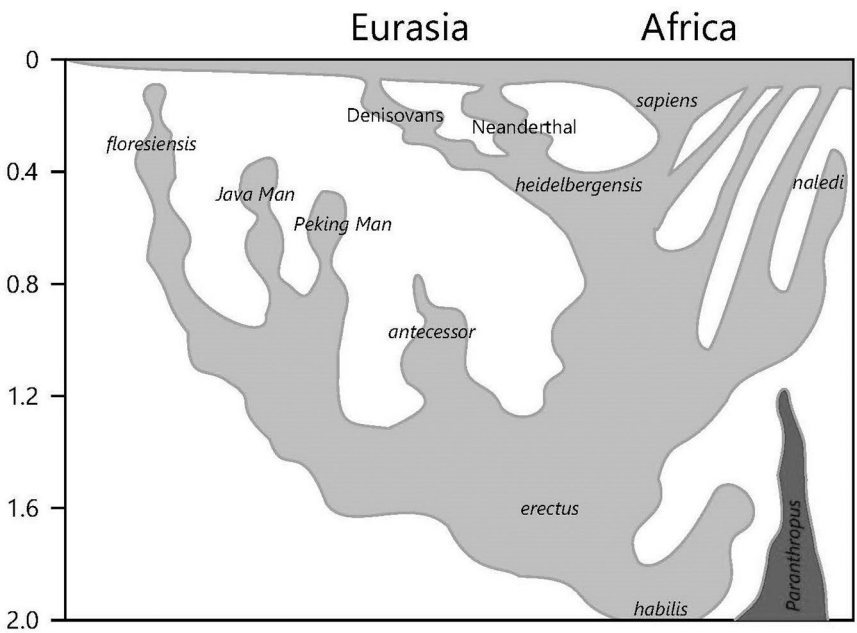

FIGURE 3 A model of the evolution of the genus *Homo* over the last 2 million years (vertical axis). The rapid "Out of Africa" expansion of H. sapiens is indicated at the top of the diagram, with admixture indicated with Neanderthals, Denisovans, and unspecified archaic African *hominins*. Late survival of robust Australopithecines (Paranthropus) alongside Homo until 1.2 Mya is indicated in purple. (https://commons.wikimedia.org/wiki/File:Homo_lineage_2017update.svg).

For several thousand years, the species *Homo sapiens* managed to survive other *Homo* ancestors and possible direct competitors in obtaining resources. At that time, there was no awareness of the dimensions of that competition. Its consciousness evolved as the species spread around the planet and accommodated or acted upon the local environment's demands. According to Leakey et al. (2012), between 1.78 million and 1.95 million years old, new fossil remains would support the idea that in the early Pleistocene of eastern Africa, there were at least two contemporary *Homo* species in addition to *Homo erectus*.

At this point, it should be noted that the expression and dynamics at the molecular level of neurotransmitters and receptors – which, together with bioelectric processes, are the basis of synaptic connectivity – due to their nature, do not leave fossilised traces. Thus, they evade the possibility of being evolutive characterised and identified with prevalent behavioural drives. Hence, proposals aimed at integrating palaeoanthropology studies with molecular neuroscience are irremediably affected by a hiatus, except through comparative studies with surviving extant species.

Among other central questions on the development of modern *Homo sapiens* are whether archaic *Homo* lineages (probably Neanderthals among them) would have contributed to the modern human gene pool and affected the evolutionary adaptation of our species, as mentioned by Evans et al. (2004), Wall and Hammer (2006), and Hawks et al. (2008). In fact, according to Evans et al. (2004), any admixture between modern humans and archaic populations would likely affect more than one locus in the genome. Furthermore, according to Hammer et al. (2011), genomes of some modern Africans contain elements derived from archaic *hominins* not found in the fossil record.

In the beginning, those species also walked on two feet and could compete for similar ecological niches and resource sources. Over time *Homo sapiens* distorted its relationship with the environment to affect all ecosystems and accelerate the extinction of some species or increase the survival risk of others. Later, it shared the risks and benefits of being just one species *Homo*, in the balance of biodiversity.

Regarding the *Homo* lineage's possible origin, as poetically stated in an Editorial from Nature (2016),

> … early human relatives left signs of their passing as evanescent and enigmatic as the Cheshire Cat from *Alice's Adventures in Wonderland* – slowly fading from view, with just its smile hanging on, until that, too, disappears.

According to Kimbel and Vilmoare (2016),

> By almost all accounts, the earliest populations of the *Homo* lineage emerged from a still unknown ancestral species in Africa at some point between approximately 3 and approximately 2 million years ago (Ma; [5–7], but see [8])… This temporal interval reaches forward in time from the latest

> known occurrences of 'generalised' *Australopithecus* species (*A. afarensis in eastern Africa*, *A. africanus in southern Africa*) to the earliest known records of two, perhaps three, species commonly attributed to the genus *Homo* (*H. habilis*, *H. rudolfensis and H. erectus*). Between them lies a million years of rare, isolated or fragmentary fossils that constitute the hard evidence for the origin of Homo…
>
> The fossil record bearing on the ancestry of Pleistocene Homo is poor.

Additionally, according to Hammer et al. (2011), there are signs that the genomes of some modern Africans contain elements derived from archaic *hominins* not found in the fossil record.

Since early ages, *Homo sapiens* have been successively scavengers, prey, hunter-gatherers, predators, farmers, artisans, industrialists, increasingly creative innovators, and corporate developmentalists of various enterprises implying diverse means. The common denominator in all stages of *Homo sapiens'* development and evolution was an exploratory toolmaker and developmental agent of new strategies with increasing complexities, with its consequences over brain-mind-tool interactions and social domains at each stage of tool-making development. Most of these increasingly complex progressive developments were based on a minority leadership of creators and developers and, hence, with the least or absent knowledge of the remaining members. Progressively tool-making know-how and instrumental development involved further consequences for the ordinary citizen mostly detached from anticipatory visions of possible long-term consequences of each development. In every new tool/technology, developmental stage lies the seed of the future. This uneven conscience of the practical consequences progressively expanded the knowledge gap between creators, technology-tool developers, entrepreneurs, and the larger population of everyday citizens.

The following excerpt from Parravicini and Pievani (2019) provides an interesting overlook at the species' evolutive process among *hominins*.

> Summing up, the three patterns of mosaic evolution here presented suggest that human evolution has been much more similar to a multiple exploration of adaptive possibilities than to a linear process of achievements, with several species showing faster pace in the evolution of some heterogeneous traits and slower pace in others, each carrying a mosaic combination of traits, each of them being closely connected to the local environmental contingencies. The result of such complex and diversified mosaic evolution is that the key transitions that shaped humanity as we know it (bipedalism, social complexity, lithic technologies, use of fire, articulated language, symbolic intelligence) do not seem to have been developed in unison by one dominant species at a time, but may have been developed by several species at a time, in scattered and punctuated ways and rates.

*

Brain and Cognitive Development

In later times, *Homo sapiens* expanded predation over the animal, mineral, and ecological resources in an uncritical process.

As it has been extensively documented for most animal species, dominance-related behavioural interactions begin with threatening behaviour before developing into fully fledged aggression. When this posturing is insufficient to decide the outcome, dominance is pursued through direct encounters.

Though this, and its dealing in a human context, has been considered previously within the context of the social domain (Colombo 2022), it is here reviewed under the view of our species' *evolutive trap*, as human acts under critical or decisive conditions are a consequence of its emotional and cognitive evolution history and its impact on the brain and mental organisation. A history that finds its origin aeons away from our present time, with its challenges, adaptations, survival, and extinction processes that progressively set up future neurobehavioural profile developments. It is a history that recognises within our order of primates and genre *Homo* additional dynamic events of survival, interbreeding, and extinction.

The evolution of the primate brain is interactive with changing feeding resources and behaviours – such as eating meat (*Homo habilis* ~2.3 Mya) and cooking (*Homo erectus* ~1.5 Mya) (Chang et al. 2013) – and the increased complexity of social interactions. In parallel with it, ecological dominance behaviour emerged as a component of such evolution. In this regard, as Flinn et al. (2005) state, the fossil record indicates that significant increases in ecological dominance roughly coincided with the appearance of *H. erectus*, 1.8 Mya, with increasing ecological dominance at the beginning of the Pleistocene. As proposed by Whiten and Erdal (2012), the evolution of the genus Homo for the past 2.5 Myr has seen a tripling of encephalisation, with unprecedented cognitive achievements. According to the authors, the evolutionary explanation for such costly developments would probably lie in what their evolving forms achieved for our ancestors regarding the regimes of natural selection they faced. Furthermore, according to these authors, the evolution of cognitive and behavioural complexity and a new socio-cognitive niche would have allowed human hunter-gatherer bands to function as unique and highly competitive predatory organisms. This was built on cooperation, egalitarianism, mindreading, language, and cultural transmission that go far beyond the most comparable phenomena in other primates.

If confirmed, that would place ecological dominance emergence within the Pleistocene (a geological epoch of the Quaternary), which lasted from about 2.58 million to 11,700 years ago. Within this context, individual and coalitional social interactions would have contributed to or coevolved with the emergence or enhancement of mental operational constructs. It involved working memory, attentional control, executive functions, and other characteristics, including altricial infants, lengthy childhood, intensive parenting, concealed ovulation, complex coalitions, and menopause (Flinn et al. 2005). As commented previously in Colombo (2022), menopause has been considered a component of eusociality in humans.

Sherwood et al. (2008) stated that a departure from the basal primate brain provided a means to display significant differences in cognitive and linguistic expression domains.

> The last common ancestor can be reconstructed to have had a brain of approximately 300–400 g that displayed several unique phylogenetic specialisations of development, anatomical organisation, and biochemical function. These neuroanatomical substrates contributed to the enhancement of behavioural flexibility and social cognition. With this evolutionary history as precursor, the modern human mind may be conceived as a mosaic of traits inherited from a common ancestry with our close relatives, along with the addition of evolutionary specialisations within particular domains.

Besides brain sizing, social structures, tool-making, and language development, one additional neurodevelopmental event detaches *Homo sapiens* brain/mental development from our *Homo* ancestors and primate relatives. This is *neoteny*, an evolutive prolonged postnatal immature condition that conditions the emergence of extended, postnatal brain development. This prolonged immature brain condition allows for its continuous development out of the maternal womb and modulates microstructural brain connectivity and mental development in a postnatal interactive environment. During the initial postnatal years, the brain undergoes plastic changes and an initial neuronal overpopulation, followed by programmed cell death (apoptosis) and pruning and reorganising brain cell contacts, increasing its processing efficiency.

As mentioned in Colombo (2020a), brain *neoteny* (postnatal extension of a juvenile condition, and hence, brain development) in our *H. sapiens* species has been considered critical to the construction and organisation of our minds (Coqueugniot et al. 2004; De Silva and Lesnik 2008). From an evolutive point of view, this developmental characteristic has only been possible if the community could offer protection during the child-raising period. Such brain postnatal immaturity involves pronounced lability on neuroplasticity processes. Brain development post-delivery takes years to complete. This allows for its growth outside physical limitations (bone structure of the birth canal) and environmental demands or social characteristics to influence the neurobiological construction of the brain and mind – a sort of *early social imprinting.*

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Material Evolution

Tool-making implies relatively complex designs and neurocognitive requisites. In evolutive terms, this domain is a matter of discussion as to whether human capacities represent a unique stage in tool design and making, with increasing capacities depending on the species-ecosystem relationships or a major actual

evolutive cognitive discontinuity in terms of comparative neural development. According to Semaw (2000), the evidence is firmly in favour of an abrupt appearance of modified stones in the archaeological record between 2.5 and 2.6 Ma, supported by Wynn (2002), who adds that ape-equivalent spatial abilities began 2.5 million years ago and would have ended with the appearance of modern abilities approximately 400,000 years ago. As Sherwood et al. (2008) comment,

> … early signs of animal butchery are found in association with Australopithecus garhi (Asfaw et al. 1999), suggesting that a small-brained (450 cm^3 cranial capacity) East African hominin from 2.5 Ma might have had the capacity to fashion simple stone tools.

Regarding neurocognitive correlations with the emergence of tool-using, in a comprehensive analysis, Vaesen (2012) considers that human tool use attests to a major cognitive discontinuity between our closest relatives and us. Moreover, relatedly, no individual cognitive trait can be singled out as the key trait differentiating humans from other animals. Additionally, some traits would enable high-fidelity cultural transmission, yielding preservation across successive generations, while others affect individual learning, thus allowing the introduction of new cultural variants. Vaesen (2012) concludes that chimpanzees lack many of these traits, thus explaining divergent neurocognitive evolution.

Stout and Chaminade (2007) reported that contrasts of Oldowan tool-making with simple bimanual percussion revealed significant cerebral cortex premotor, parietal, and occipital activations indicative of the greater sensorimotor, spatial, and attentional demands of the tool-making task. In 2008, Stout et al. reported a differential brain engagement after comparing Acheulian and Oldowan tool-making. Addressing neurocognitive involvement, Stout et al. (2008) reported that modern humans engaged in Acheulean hand axe production showed recruitment of ventrolateral frontal cortex activity, which was not the case when engaged in Oldowan-style tool-making. This brain region of the prefrontal cortex would be involved in coordinating hierarchical action sequences requiring higher cognitive demand. Furthermore, according to these authors, the observed overlap in this brain region of language circuits suggests the coevolution of language emergence, tool-making, and functional cortical lateralisation. That is, language would represent a key component of human cognitive evolution.

It seems opportune to mention the various domains involved in cognitive performance, as briefly accounted for in Lipina and Colombo (2009), that basic processes involved in early cognitive control and language development, such as the attention subsystems, working memory, flexibility, and phonological processing, are fundamental to all forms of cognitive activity and social behaviour throughout the life span.

The question of how these components developed during the various stages of *Homo* evolution and social interactions and demands, as well as material and

language development, may lack an adequate response. Perhaps the concept of an interactive neurobehavioural progressive development could place into perspective this issue. However, the interaction and adaptation of gregarious animal species to ecological environments provide a general perspective on communication evolution. In other words, the significant differences in animal communication and social (gregarious) learning should caution from detaching human cognitive and communicational characteristics from an evolutive frame.

Within a domain of species-ecological dynamic interaction, the comparative cognitive and tool (technological) development attained by humans underscores a breakthrough in the hypothetical evolutive process with its ecological-related saltatory development. In this theoretical context, it does not rule out that species-environment interactions called for – or allowed the emergence of – different abilities maximised in *Homo* evolution by additional interactive capacities that emerged at a particular stage in tool development and use.

On evolutionary grounds, material evidence does not easily escape from archaeological scrutiny of ancient *Homo* grasslands. Oldowan tools were first discovered by Gorge by Louis Leakey in Tanzania in the 1930s at Olduvai Gorge.

Gowlett et al. (2022) reported more recent findings on new Oldowan locations at a high level within the caldera of the extinct Kilombe volcano – located in the central rift valley of Kenya – dated at ~1.78 Ma. According to the authors, their presence at a high level in rugged landscapes indicates that the associated *hominins* were exploiting a full range of environments. They further state that Oldowan tools probably are the oldest and most simplistic of the accessible stone tools we know of (although cut marks at Lomekwi may show stone tools existing 3.3 million years ago) dating back to *Homo habilis* at 2.6 million years ago and possibly earlier.[1]

Ian Tattersall (1992) provides an exciting search to answer the question of at what point *humanness* could be said to have been achieved. His progressive insight into the several abilities and cultural construction of successive developments since *Homo erectus* provides a kaleidoscopic perspective of tools and creative traces expressed at different times by the *Homo* species. Considering tool use by other primate and non-primate species (e.g., Caledonian and Hawaiian crows, Rutz et al. 2016; elephants and dolphins, among others[2]), there are difficulties in assigning humanness since, according to Tattersall (1992), there appears to be no correspondence whatever between biological and cultural innovation.

It should be stated that the concept of humanness implies not a single achievement or behavioural profile but a set of integrated expressions in tool use, social, artistic, and language domains.

The reports mentioned above do not involve primary emotional domains (drives) though they evolved in continuous interaction with species-specific brain network levels in behavioural construction.

*

In evolutive terms, material wealth could be construed as the number of feeding resources and territory an individual or animal group controls. In gregarious species, this implies concerted efforts to defend their possessions.

In the opinion of Boehm (2012b), the common evolutionary predecessor to the *Homo*, chimpanzees (*Pan troglodytes* or common chimpanzee) and bonobos (*Pan paniscus* or pygmy or graceful chimpanzee**)** lived in social constructions based on dominance by hierarchy. There is a marked difference in the "management of conflicts" that are generated in the intergroup relations of chimpanzees (conflict tendency, male prominence) and bonobos (tendency to prevent them, female prominence).

Based on this, Boehm (2012b) argues that humans retain conflict-prone behaviours, a sort of "bipolarity" whose predominance distribution in the world population could not be uniform. Should this duality of behaviour be linked to the structure of the human genome and the subsequent basic neurobiological configuration, it could be considered the existence of human groups in which one or another tendency predominates, constantly exposed to cultural conditioning.

The evidence accumulated in the comparative analysis of the chimpanzee's intergroup fights and hunter-gatherers' neighbouring groups suggests to Wrangham and Glowacki (2012) that the model is based on the behaviour of communities of chimpanzees provides a sufficient basis for understanding the biological and cultural evolution of armed confrontation among humans. Other authors include, with dialectical intentions, the bonobo (*Pan paniscus*) and the gorilla, which express different strategies for social conflict resolution.

As stated by Desmond Morris (1967, in *The Naked Ape*, cf. Hermann, 2017),

> If we are to understand the nature of our aggressive urges, we should look at them in terms of our animal origins.

Violence has been and continues to be a constant in our human civilisation. From a neurobiological point of view, in the construction of violent behaviour participate limbic circuits (amygdala, hypothalamus) and prefrontal control (Blair 2004; Gobrogge et al. 2007; Siever 2008), and hormonal influences (Rose et al. 1972; Gordon et al. 1979; Westlye et al. 2017) about which there is abundant bibliography, which includes the social modulation of sexual hormonal regulation in different species. Observations made in humans by Cueva et al. (2017) raise possible individual and species variability in the effect of testosterone on aggressiveness.

In the natural kingdom, all species are programmed to ensure power building to achieve three components essential for their subsistence: the territory, to ensure the provision of nutrients for survival and opportunities for playback; their species-specific social behaviour and the ecological niche. Otherwise, extinction and replacement occur. Our species also arose from that triad, germinal to the animal world.

Phenotypic changes – due to adaptation and survival selection of species – express changes in forms and limit physiological and strategic behaviour. However,

they do not renounce those three pillars for subsistence, to which complex and variable cultural values are added to the human species. Cultural variability and complexity partly express how our species has reformulated, sublimated, and sophisticatedly camouflaged those basic needs. It also forced its members to join patterns of behaviour in accordance or feasible with the prevailing rules in the complex organisation of the successive societies that have built our socio-culturally complex "civilisation."

As a result, large population segments slide into a grey zone of the social structure with a high risk for their survival or the construction and expression of their identity. A "grey zone" of an institutionalised social construction combines the comparative lack of access to knowledge, depersonalisation, affected identity, and domestication or marginality of large population groups. This continuously builds a *social* and *cognitive gap* that impacts individual and social construction, further complicated – as stated by de Waal (2005) – since humans would have removed the only handle biology has to modify us and promote continued evolution, which is differential reproduction.

In fact, humans have progressively replaced, to a significant extent, the natural impact of the environment on phenotype expression by socio-cultural conditions with a similar capacity of impact on human evolution. Precisely, the resulting inequalities are enlarging the cognitive and developmental gap among nations and social strata. As stated in the United Nations Report (2020), inequality has grown for more than 70% of the global population, hampering economic and social development. Furthermore, the report shows that the wealthiest 1% of the population are the big winners in the changing global economy, increasing their share of income between 1990 and 2015, while at the other end of the scale, the bottom 40% earned less than a quarter of the income in all countries surveyed.[3] Furthermore, a new call and promises of new advances have been made, as will be further considered later.

> The Sustainable Development Goals are a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere. The 17 Goals were adopted by all UN Member States in 2015 as part of the 2030 Agenda for Sustainable Development which set out a 15-year plan to achieve the Goals. Today, progress is being made in many places, but, overall, action to meet the Goals is not yet advancing at the speed or scale required.

On what factual bases are these expectations construed if the very basic construction of our civilisation remains conditioned by dominating profit values?

It is as if the constructions of the virtual world of the collective constructions – corporations, institutions, beliefs, nations, social organisations – that is, the fiction based on abstract groups that replaced the object and concrete world – in the words of Harari (2014) will not adjust to the intimate human nature. We have not stripped ourselves of the ancestral motivational vectors. It should be added

that, from this, a new pragmatic and material-technocratic-based world has been generated, whose development "energises" a new cultural "push" with collective consequences of uncertain prediction.

*

The social repression of implicit tendencies in our original animal condition has allowed the construction of cultural strata above those though it has not managed to "deactivate" them but rather reformulate or repress them. Consequently, their pressure on cultural resources and fabrics manifests in violent or destructive behaviours. Perhaps one of the central notions in this topic is constituted by the evolutionary concepts of "territory" and "neighbour to suppress," which should be replaced by cooperative behaviours and convivence with variable cultural expressions.

Statements by Tomasello (1999) have been questioned by Boesch (2005):

> Ignoring most published evidence on wild chimpanzees, Tomasello et al.'s claim that shared goals and intentions are uniquely human amounts to a faith statement. A brief survey of chimpanzee hunting tactics shows that group hunts are compatible with a shared goals and intentions hypothesis. The disdain of observational data in experimental psychology leads some to ignore the reality of animal cognitive achievements.

Regarding one of our closest latest *Homo* relatives, the Neanderthals, studies of their complex behaviours face a sombre enemy: time passed on an extinct species. However, Langley et al. (2008) approached this issue and debated whether the number and diversity of complex Neanderthal behaviours increased between 160,000 and 40,000 years ago is due to preservation actors, the evolution of cognitive and behavioural complexity, cumulative learning, or population size.

This implies a continued behavioural and instrumental development in 120,000 years, approximately half of the estimated life span of our species. Rodríguez-Vidal et al. (2014) provide further insight into possible abstract thinking by Neanderthals based on the engraving on the bedrock at Gorham's Cave. It would represent the first directly demonstrable case of technically elaborated, consistently and carefully made nonutilitarian engraved patterns, an example of abstract thought. The authors conclude that this engraving represents a deliberate design conceived to be seen by its Neanderthal maker and cave companions. The authors conclude that abstract thought ability is not exclusive to modern humans.

Regarding the fate of Neanderthals, an earlier report by Stringer and Davies (2001) posed uncertainty, as they state that we are still far from pinning down the processes that caused Neanderthals to vanish about 30,000 years ago after existing for at least 200,000 years. According to Chen et al. (2020), Neanderthal's fate suggests an admixture since it would have played a significant role in shaping

patterns of human genomic variation, including gene flow with extinct *hominins* like Neanderthals and Denisovans.

Furthermore, according to Greenbaum et al. (2019), considering a long-lasting contact zone between Neanderthals and modern humans, surviving disease transmission would have been a factor in their final fate, giving modern humans an advantage in their subsequent spread into Eurasia.

*

It has been stated (Siquijor 2020) that our species is facing a nodal point where technological developments will define our evolution as a species. In its broad sense (*tool use*), technology has been a *twin material domain* event in human development since early ages. Reiteration of trial-and-error behaviour in pursuit of a practical goal or knowledge expansion and development of methodologies allowed humans to traverse various developmental stages with increasing complexities in the material world. It allowed manipulating environmental interaction variables with progressively increased power and efficiency. Moreover, this took place from the beginning when *Homo* added a practical attribute or goal to material events that allowed it to survive and compete in the natural world. At variance with occasional or opportunistic tool use by other animal species, *Homo sapiens* developed a progressive evolution of material artefacts once *Homo erectus* reached the artisan ability to manufacture Oldowan-like spear points. Since its stage of artisan or craftsmanship, tool-making later evolved during our Era into techno capacities – yet not abandoning its role of an expert, purposeful toolmaker in a broader, more sophisticated sense – by incorporating complex theoretical knowledge and component interactions well before our current times. Hence, it would be a misnaming to attach the qualifier of *techno sapiens* only to the contemporary exponents of the species, as proposed (Siquijor 2020).

*

In other words, *Homo sapiens*' evolution underwent *a series of nodal points* that marked the direction of dominant power and not only survival. Following the artisan stage, technology and scientific practices have been present in our evolution, not just recently.

According to different authors, early roots can be traced to Ancient Egypt and Mesopotamia from around 3,000 to 1,200 BCE, and others place it with Aristotle and the Greeks some 300 years BCE. Modern science has been linked to instrumental developments that allowed new hypothetical constructs, during the 17th century, albeit with different consequences and goals, as described in the following paragraph. A few examples follow that predate our *technological era*.

> The secret of the Antikythera Mechanism –ancient clock-like device– that tracked the cycles of the solar system, the ancient Greek device discovered

> in 1901 and regarded as the world's first computer, has been solved by scientists… After numerous studies, it was estimated to have been constructed between 150 BC and 100 BC. A later study places it at 205 BC, just seven years after the death of Archimedes.
>
> *(Figure 4)*[4]

Regarding the *Antikythera Mechanism* (Figure 4), Freeth et al. (2021) consider that the mechanism would reveal the creation of genius, combining cycles from Babylonian astronomy, mathematics from Plato's Academy, and ancient Greek astronomical theories.

According to the *Encyclopedia Britannica*,[5]

> The world had one of its great mechanical geniuses in Archimedes, who devised remarkable weapons to protect his native Syracuse from Roman invasion and applied his powerful mind to such basic mechanical contrivances as the screw, the pulley, and the lever. Alexandrian engineers, such as Ctesibius and Hero, invented a wealth of ingenious mechanical contrivances including pumps, wind and hydraulic organs, compressed-air engines, and screw-cutting machines. **They also devised toys and**

FIGURE 4 The *Antikythera Mechanism*, known worldwide as the world's first computer, was created by ancient Greeks. Credit: National Archaeological Museum of Athens (https://greekreporter.com/2022/09/15/antikythera-mechanism-secret/).

> **automata such as the aeolipile, which may be regarded as the first successful steam turbine**.
>
> *(Bold letters inserted by JAC)*

The *aeolipile* is seen in Figure 5, whether first described by Hero or Viturbio and perhaps inspired in the previous work by Ctesibius (285–222 BC) on the effects of compressed air. The heated air inside the main container is expelled through the pipes, injecting movement into the device.

And later – leaving aside all the creations by the Renaissance polymaths – regarding the steam machine, from the same source,

> The research of a number of scientists, especially those of Robert Boyle of England with atmospheric pressure, of Otto von Guericke of Germany with a vacuum, and of the French Huguenot Denis Papin with pressure vessels, helped to equip practical technologists with the theoretical basis of steam power…

Hence, the theoretical, inventive, and constructive genius of our human species recognises a long history of advancing technologies much before our current

FIGURE 5 A sketch of the *aeolipile*, as devised by Ctesibius (https://commons.wikimedia.org/wiki/File:Hero%27s_Aeolipile,_1st_century_AD,_Alexandria_%28reconstruction%29.jpg).

era of artificial intelligence, spatial stations, and robotics, and alike, that does not justify a taxonomic renaming of *Homo sapiens* based on modern, current informational and technological developments. Otherwise, perhaps whenever humans progress in other domains (social and ecological) would also justify such taxonomic action and alternative qualifiers to *Homo sapiens.*

The exponential growth in our species' development poses a complex perspective in technological domains. Essentially, the profile of our ongoing species' evolution is driven by an accelerated scientific-technological development beyond our collective capacity to understand fully, control, contain, or predict its social impact. This adds to cognitive and educational inequalities due to economic and social developmental domains representing additional components of our species' complex *evolutionary trap.* Within the domain of artificial intelligence, the hybridisation of the biological brain and external intelligence already began with the progressive use of external memories or data sources (books, computers, and the internet). Regarding the impact on human development, one central aspect is how we use that combination, whether it is accomplished passively or interactively. This will decide the fate of our neural networks. That is, one could read a book, finish it, and not have much idea of what is expressed there unless we analytically interact with it and process what we have read; this implies motivation and education. Though the development of artificial intelligence seems inevitable, the issue is how we incorporate progressive technological developments into strategies that favour individual development and not replace us as thinking beings. The question is the objective in using that technological empowerment of our mind, which would vary with the considered culture, a sort of world puzzle since it defines values, goals, and behavioural plasticity. Additionally, many neglected social sectors are marginalised from the said potential. So, the question arises, what are our priorities and goals as a human community when promoting technological insertion into such a variety of cultures?

*

Socialisation Implies Taming of Natural Drives and Abiding by Imposed Rules of Convivence under Differing Sociopolitical Structures

There seems to be a hidden pride in our species that prevents us from considering that human behavioural profiles did not emerge from an evolutionary *tabula rasa* but from a rich history of ancestral behavioural moulding exerted throughout millennia by *Homo* species tied to our genetic construction and that affect our contemporaries' socioecological framework. Our behavioural construction has its roots in ancestral habits and survival drives that were crystallised in basic neurobehavioural circuits over millennia, be it as predators or potential prey. In contemporary times, these behavioural profiles are expressed under a cultural

umbrella that emerges most clearly under critical conditions (physical and emotional survival, severe social distress, dominance, or prevalence challenges). Our species has the cultural plasticity to hide prevalence drives under various cultural profiles, assigning high moral values to the confrontation or persecution of *the different* or the right to prevail. Those drives are not an exclusive human product but the remains of ancient animal ones practised under the most different socioecological conditions, with which we humans interact based on our complex and diverse cultural profiles.

This process takes place from postnatal days and continues throughout the lifetime, enforced by four power sources of different natures: parental, formal education, state-driven, and corporate means carving for profit supposed survival needs. Thus, identity construction undergoes extraordinary pressure aimed at taming natural drives and profiling an "acceptable" citizen. The spontaneity quota ("freedom," *sic*) (see Colombo 2013) leftover will depend on the interaction of those powerhouses acting at different developmental stages and with different biases and strategies and the individual personality structure. Perhaps the difference with domestication is in such a quota and the individual potential to overcome or minimise it.

Does taming natural drives and abiding by imposed rules specific to each human cultural dominant profile – whether of religious, financial, or political origin – imply forms of domestication (replaced in textbooks by socialisation)? Or *socialisation* implies a euphemist domestication process? Variations in procedures and outcome processes can be detected under different political, economic, and social structures, where the concepts of caste and human rights significantly diverge.

Perhaps the most desirable common human goal is to attain the maximum degrees of individual freedom under convivial social structures, suppressed or menaced under different forms of manifest or subtle oppression or *attempted domestication*. The latter would signal the dawn of genuine democracy and individual identity. This, though at present, represents a utopic goal affected by ancestral animal drives; it should constitute a lighthouse on the horizon of human development.

*

Social Status as Privilege and Dominance

As stated, Kelley (2005) poses an intriguing question, did the same constellation of causal factors that gave rise to the chimpanzee pattern of the coalitionary killing of neighbours produce a parallel (and convergent) outcome among Palaeolithic *hominins*?

According to King and Figueredo (1997), of the six personality factor analysis ratings – surgency (a personality factor characterised by quickness and cleverness),

agreeableness, dependability, emotionality, openness, and dominance – five of them are shared by humans and chimpanzees.

> The discovery of the human Big Five personality structure in chimpanzees would thus parallel discoveries of advanced social intelligence in this species and would imply that the human pattern of personality organisation long antedated the recent emergence of Homo sapiens, just as the current research on ape behaviour indicates that advanced social intelligence extends far back in our hominid ancestry.
>
> *(King and Figueredo 1997)*

The authors state further that the sixth factor was dominance-related and was consistent with the central role of dominance in chimpanzee personality.

This statement seems blindfolded to human history, where dominance behaviour has been collectively transferred to political, corporative, and religious domains. Also, it contradicts Smith's (2012) statement that human nature can express extreme violence, probably inherited from our primate ancestors. The concept parallels our view of ancient drives crimped to our basal, ancestral neural circuits and conditioning our behavioural trend and profile, mostly under critical circumstances or when attaining dominant social stages.

The backbone of dominance in animal behaviour expressed as various forms of aggression is represented at the brain level by basal, evolutive conserved neural circuits. These, through evolution in primate species, involved complex interconnections with the neopallium (involving phylogenetically newer brain circuits).

Laland et al. (2015) consider that *Evo-devo* provides a causal-mechanistic understanding of evolution. Among the vital empirical insights are that phenotypic variation often involves changes in the gene regulatory machinery that alters the timing, location, amount, or type of gene product. Furthermore, recognising that genome change is an active cell-mediated physiological process that responds to challenging life-history events fits neatly with the EES's ("*extended evolutionary synthesis*") treatment of plasticity.

This manifest plasticity is probably mainly related to neo- and archipallium neural circuits. More ancient circuits involved with basal survival behaviours (feeding, survival, regulation of internal milieu, and reproductive) – though modulated by supra diencephalic, evolutive recent neural circuits– constitute the basis for behaviours that tend to emerge under critical conditions and affect open behaviour.

As a comprehensive view of behaviour evolution, the social behaviour network (O'Connell and Hofmann 2011) and the *extended evolutionary synthesis* as proposed by Laland et al. (2015) function as integrated circuits, though node interactions can be involved in various behaviours (e.g., aggressive behaviour, male sexual behaviour, maternal care, and male-male aggression). The mesolimbic reward system and the social behaviour network involve telencephalic brain regions and dopaminergic projections from the midbrain ventral tegmental area.

According to O'Connell and Hofmann (2011), complementary lines of evidence converge on the fundamental insight that the brain regions in question are indeed conserved across vertebrates, thus suggesting that these neural circuits regulating behaviour are evolutionarily ancient and were already present in early vertebrates.

According to Goodson (2005), the social behaviour network within the basal forebrain and midbrain present in birds and teleost fishes is homologous to the social behaviour network of mammals.

As mentioned, basal neural circuits (mesencephalic and subthalamic) recognise an ancient presence in animal evolution. They involve homeostatic and basic behavioural drives (dominance, survival), which also involve the limbic system. Hence, the question arises about how they may affect human behaviour and socio-cognitive abilities. Additionally, whether human history provides proof allowing to disclose behavioural evidence for the presence of those ancient brain/behavioural components, human behaviour could be considered the outcome of the interaction between socioecological environmental cues and innate behavioural mechanisms, borne with a significant repertoire of genetically encoded ancient survival and dominance drives. As implied in Pierce and White (1999), the process of natural selection involving survival selection continues to represent the backbone of the contemporary settings of our species. Thus, our behavioural output carries ancient components interacting with modern, culturally profiled behavioural moulding.

Though this theme will be discussed in other chapters, more general considerations are made here.

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As stated earlier (Colombo 2022), regardless of the considered species, material and emotional conditions during early development and insertion within a given social structure affect individual degrees of freedom and brain/mental potential during adult life. Based on comparative relative neural plasticity across species, under given circumstances – mostly in human domains due to its prolonged postnatal brain maturation – such degrees of freedom could be modified whenever means are implemented in due time and form. Within variable degrees among animal species, they underscore the universality of early raising conditions in moulding or defining the probability of individual profile and social insertion. The spread and expression of the menu of social and behavioural variables involved will depend on the species' genome, individual and collective social standings, and resilience.

Von Rueden et al. (2008) made an absolute statement regarding social status and its privileges, as they affirm that,

> In all human societies, individuals differ in social status depending upon their age and personal ability (Sahlins 1958; Service 1971). In laboratory-based

> small group studies, status hierarchies emerge spontaneously (Bass 1954; Campbell et al. 2002; Kalma 1991). Even among "egalitarian" foragers, who are characterised by widespread resource sharing (Kaplan and Gurven 2005; Winterhalder 1986) and some degree of status levelling (Cashdan 1980), certain individuals consume more resources, get the best pick of mates, and take a more central role in group decision-making (Boehm 1999; Trigger 1985; Wiessner 1996). Whether implicit or overt, classification by social status is a human universal.

This solid statement, applied to the animal kingdom, raises the question if it represents an unyielding, universal animal signature or whether *Homo sapiens'* evolution would eventually incorporate new social values to modify it. This universality of *social status* impact on evolutive and early quality feeding and learning context grounds probably includes most of the gregarious animal species, so, once again, humanity keeps condoning ancient animal drives. Perhaps the Gordian knot resides in finding the means to avoid what ancient drives derive into privileged, dominant social classes and drilling a profound gap in welfare, education, and individual progress.

The concept of environmental effects on individual development was advanced by C. Darwin (1874). Examples of early developmental conditions (feeding, emotional, and cognitive) on developmental profiles abound among humans (Colombo 2007, 2015, 2020a, b, 2022; Lipina and Colombo 2009) and non-human species (e.g., Harlow 1959; Krech et al. 1960; Altman and Das 1964; Volkmar and Greenough 1972; Uylings et al. 1978; Turner and Greenough 1985; Kemperman et al. 1997; Kozorovitskiy and Gould 2004; Lieberwirth and Wang 2012; Salwiczek et al. 2012; Weiner and Toth 2012; Moda et al. 2013; Warner et al. 2019; Alward et al. 2020; in insects see Barchuk et al. 2007).

Though there is controversy or lack of coincidence in defining the concept of *status*, we will adopt an evolutionary concept equating social status as homologous to non-human dominance, as implied in Tung et al. (2012). However, some human status processes and expressions are absent in non-human animals. According to these authors, social status in non-human primates is encoded by dominance rank, which defines which individuals yield to other individuals during competitive encounters. Additionally, Tung et al. (2012) conclude that when hierarchies are strongly enforced or subordinates have little social support, low dominance rank can lead to chronic stress, immune compromise, and reproductive dysregulation.

According to Henrich and Gil-White (2001), status as a rewards hierarchy implies a hierarchy of privileges since it involves relative differences in access to resources within a social group. It results in *dominance hierarchies.* In non-human animals, status is usually based on some physical advantage generating dominance.

Since exerting dominance on the construction of social power among humans (and other animal species) involved relational factors that could be conceptualised

as political strategies, it is interesting to the concepts advanced by Gintis et al. (2015) as follows.

> … many primate species, including humans and our closest living relatives, seek to dominate others and are adept at forming coalitions. It is thus likely that their most recent common ancestor also possessed these traits. Dominance-seeking and coalition-formation in humans, then, are not purely cultural. *Rather*, *humans are endowed with the genetic prerequisites for this behaviour*, *as are numerous other primate species*.
>
> *(Wrangham and Peterson 1996) (Italics inserted by JAC)*

Within this interactive domain, communication proficiency and mental processes evolved in complexity among species within the animal kingdom, adding a *political* dimension to social life linked to the expression and degrees of freedom for the resolution modes of social inequalities. Thus, the political concept as the display of interactive means and implicit goals (dominance or prevalence in its most comprehensive meaning) has been a constant in animal evolution and survival, though with species-specific behavioural interactive modes. Although the expression of *zoon politikon*, as mentioned by Aristotle (cf., Gintis et al. 2015), is maximised in the human species, it recognises an evolutive development expressed in different modes across species. When *political* interaction fails, direct physical encounters develop. In certain species, this behavioural expression reaches annihilation of the opponent without previous *political* interaction or under certain circumstances (territorial, reproductive challenges). As further stated by Gintis et al. (2015),

> … there are broad similarities in social dominance and coalition formation across all multimale/ multifemale primate species. This fact runs counter to traditional political theory. Aristotle's zoon politicon notwithstanding, political theorists have widely assumed that political structure involves purely cultural evolution, **whereas the primate data show roots to political behaviour going back millions of years**. The primate evidence is important because it lays the basis for an evolutionary analysis of human political systems (de Waal 1998). Such an analysis may elucidate the role of basic human political predispositions in reinforcing and undermining distinct sorts of human sociopolitical structures.
>
> *(Bold letters inserted by JAC)*

This *political domain* acquires among humans an expanded character involving most behavioural interactions, enriched by language development and a complex set of values and drives. As stated by Gintis et al. (2015), dominance and coalition formation are not purely cultural. However, neither are limited to primate species but are currently expressed in mammalian societies as social dominance hierarchies. Behavioural interaction profiles moulded by biocultural factors

involve different degrees of complex constructions and cognitive domains, excelling in humans. This, added to a continuous arms race and financial power development, transformed sociopolitical interactions and affected the balance of its expression among the diverse human communities.

Among humans, once emergent dominance hierarchies succeeded in egalitarian societies, other factors such as wealth and oppression (hierarchy prevalence) entered the scene, modifying the political landscape. As described by Gintis et al. (2015), an egalitarian political system persisted until cultural changes in the Holocene (current geological epoch) fostered the accumulation of material wealth, which made it possible to sustain a social dominance hierarchy with strong authoritarian leaders.

Cultural complexity in human sociality opens a series of domains in which comparatively uneven personal cognitive resources or social profiles generate prestige. The main point is whether it generates undue privileges (e.g., personal wealth derived into social dominance or prevalence) or inequalities that will endure or deepen them. It would imply further stratification and a tendency to interfere with access to individual improvement or progress. As Henrich and Gil-White (2001) stated, whether it implies persuasion or force (dominance) in our unequal world society, the latter option has a base due to staggering inequalities in wealth and education among individuals and social groups (nations, social classes, and populations poverty) as described before (Colombo 2007, 2010, 2015, 2019, 2020a, b, 2021a, b, 2022). They represent conditioning factors in social power interactions. In other words, dominance has set up survival probability and evolutive paths of living species and extended into historical human paths of social organisation.

As stated by Henrich et al. (2010), there is a sound basis to support the idea that the evolution of societal complexity, mainly during the last ten millennia, involved the selective spread of those norms and institutions that best facilitated the successful exchange and interaction in socioeconomic spheres. This is beyond local networks of durable kin and reciprocity-based relationships.

*

On evolutive and metaphorical terms, from being integrated into natural life, we have moved on to the role of *imperialists* of the macrobiological world and behaviour – an existence – imbued with mysticism, megalomania, and fanaticisms. The inertia of progressively expansive knowledge has already triggered mechanisms of "marginalisation." Questioning our roots in the natural kingdom has opened paths towards supernatural or esoteric agencies. Technological advances have entered the cultural world as *technocracy* and promoted projects of extraplanetary adventures. On metaphorical grounds, we must be careful not to copy the mythological Antaeus, whose forces abandoned him when his feet lost contact with her mother, Gea, and thus he was defeated by Heracles.

***

Notes

1 https://www.sciencedirect.com/science/article/abs/pii/S0003552121001801; https://www.academia.edu/s/f58a847fab?source=ai_email.
2 https://www.livescience.com/9761-10-animals-tools.html.
3 https://news.un.org/en/story/2020/01/1055681.
4 https://greekreporter.com/2022/01/17/antikythera-mechanism-secret/.
5 https://www.britannica.com/technology/history-of-technology/.

2

EVOLUTION, BIOLOGICAL INERTIAS, VIOLENCE, AND *THE EVOLUTIONARY TRAP*

Regarding the possible forces that acted on human evolution, among them is included the fact that hominin groups exchanged genes with primate species that either were in the process of evolving thoroughly modern features or were already fully modern in appearance, as proposed by Hammer et al. (2011). Smith (2012) also stated that the forces that transformed anatomically modern humans into psychologically modern humans were mainly cultural. According to IPBES et al. (2019), biological communities are becoming more like each other in both managed and unmanaged systems within and across regions, a human-caused process that leads to losses of local biodiversity, including endemic species, ecosystem functions, and nature's contributions to people.

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Competition for Survival

In natural life, intraspecies conflicts result in adaptive fitness and survival probability. At the human level, the loss of cultural diversity would imply a reduction of human richness and implicit variable strategies to cope with demands stemming from human interactions and ecological events.

There is disagreement among anthropologists about when conflictive encounters acquired the characteristic of armed struggle and whether they would have developed among *Homo sapiens* tribes or contemporary *Homo* species. There is also a debate on whether there is physical or ethnographic evidence of early encounters. Before including some specialised statements, from an evolutionist point of view, animal competition for territorial, feeding, and reproductive domains has been rich in providing evidence of gains based on fight or flight strategies. Thus,

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encounters combining dominance/prevalence and submission or fleeing represent a universal interactive behavioural output in the animal kingdom.

Regarding *Homo* species (*H. sapiens*, *Neanderthal*, *Denisovan*, and *H. erectus* during some time), territorial and feeding competence with other *Homo* represents an ancestral interactive component that implies the possibility of either occasional confrontations or competence for prevalence or hypothetical interbreeding. In gregarious animal communities with a hierarchical organisation, the extra personal space and social rank – with its implied privileges – are subjected to similar belligerent behaviour. In addition, ancestral tribes of non-human primates that predated *Homo* in Africa and Europe, plus non-primate animals, must have competed with and predated gatherer and hunter-*sapiens* tribes. This general picture suggests that *sapiens* tribes would be experienced in these encounters and employed accessible primitive defence and attack strategies and instruments. Hence, the notion of intra- and interspecific aggression would have developed since early times among territorially overlapping *Homo*. Interspecific encounters would have been sporadic, considering the probability of an initial low demographic density of *Homo sapiens* tribes.

Predatory feeding must have progressively depended on the development of instrumental means to accomplish their prevalence – once *Homo sapiens* changed from hunter-gatherers to scavenger-gatherers, as suggested by Gintis et al. (2015),

> … it now appears that early hominins, in the transition from the Pliocene to the Pleistocene, were more likely scavenger-gatherers than hunter-gatherers, of which there is firm evidence dating from 3.4 Mya.
>
> *(McPherron et al. 2010)*

Whether they were active or passive scavengers (waiting for other scavengers to finish their job), they had to physically prevail over firstcomers, implying operational strategies or added instrumental power.

The hunter-gatherer stage implied a social structure of debatable nature, as stated by Fashing (2001), who suggests that political hierarchy followed a U-shaped trajectory during human evolution. That is, from a common hierarchical ancestor with the African great apes through an egalitarian hunter-gatherer stage to the hierarchies represented by chiefdoms and other more complex civilisations.

Smith et al. (2010) analysed limited wealth transmission and inequalities among hunter-gatherers, occasionally leading to social stratification and social mobility based on population size and residential mobility. Hence, a primary constraint on material-wealth accumulation and inequality in hunter-gatherer societies would reside in the degree of residential mobility, heavily influenced by spatiotemporal resource variability. Based on the combined picture from the intergenerational transmission and inequality (Gini) estimates, these authors further propose to reevaluate the social structure of hunter-gatherers and reassess the concept that they are characterised by equality in wealth and life chances.

According to the above comments and considering animal history, dominant behaviour – however relative and conditioned – appears as a universal component of social species and our early *sapiens* ancestors. Once larger populations were attained, social complexity and hierarchies' development reformulated wealth and dominance power distribution.

Gilman (1981) proposed the rise of complex, hierarchical societies with larger populations than hunter-gatherers that deployed comparatively more powerful productive forces, illustrating the "principle of competitive exclusion."

Hominid groups' increasing and accompanying sophisticated cognitive abilities and social organisation were likely to convey advantages in ecological interactions. This made possible a coevolutionary synergy of ecological dominance and social complexity until this interaction made a 180° turn based on prevailing dominance and survival gains, resulting in ecosystem devastation and entering conflictive social domains.

The trigger for a hierarchical organisation and the emergence of elites in large populations probably recognises several promoters. These were probably associated with individual and group psychological profiles, magic belief constructions imposing emotional dominance, agricultural intensification with productive capacities providing reliable feeding services, and property domains that emerged through political dominance interactions and further segregation of social strata. It seems worth reminding that ancestral animal drives involving dominance are unyielding promoters of hierarchical standings and conform to *the evolutionary trap* that consolidates our species under complex, progressive, cultural scaffolding.

This social dynamic involving property and wealth generated opposing resistance and interactions that set up conditions for social unrest, repression, militarising social power structures, and political and ideological developments. For belligerent (or dominant) behaviour incorporated into the cultural domain – *predatory culture* – may acquire open or covert strategies characteristics. The latter case aims to suffocate the capacity for informed criticism of large human groups using different resources. These include, in modern times, the promotion of cultural banalisation and consumerism to generate self-satisfaction and false needs or to degrade discerning human capacity, such as having the possibility for a critical assessment of information. In such a process, social and economically low-ranked citizens become instrumental to hierarchical decisions as labour or fighting forces or generate their dynamics and interaction strategies.

On comparative grounds, let us consider that political actions are expressed in communities of apes, such as gorillas and chimpanzees, aimed at obtaining sexual, feeding, or hierarchical privileges (de Waal 2007). Primary forms of dealing with dominance disputes involve aggression, consensus, or submissiveness. The thesis is that they represented the spectrum of basic animal behaviours involving hominid and ancestral *Homo* species and relied on *Homo sapiens*.

Homo sapiens' DNA *backpack* carries a long-lived history of exchanges among compatible *Homo* ancestries that, in turn, carried previous universal adaptations

and managed to survive during difficult periods of life on Earth. As mentioned by Atran (2002), on biological and brain structural grounds, conditions that made human life possible on Earth were mainly based on strategic and instrumental development, which impacted mental organisation and the subserving neural circuits for survival. We may carry ancient drives deeply entrenched in our evolutive life history. With the emergence of the human species, continued predator-prey interactions were progressively masked under sophisticated cultural formatting (dominance rights, consumerist cultural market, slavery, wealth-profit dominance). As discussed in forthcoming chapters, human predatory strategies on members of the same species are expressed in conditions of individual and collective human rights, forced labour, deprived developmental conditions, hierarchical dominance strategies, and warmongers allied with corporative or political power profiteers.

According to Cummins (1996), the human capacity for these types of reasoning (transitive and deontic) has evolutionary roots that reach deeper into our ancestral past than the emergence of the hominid line, and the operation of these evolutionarily primitive reasoning systems can be seen in the development of human reasoning and domain-specific effects in adult reasoning.

Furthermore, as Neuberg et al. (2010) posit, considering that humans are social animals, the problems faced by our ancestors included not only those faced by all animals (e.g., resource acquisition, self-protection, mating) but also those specific to social life (e.g., affiliation and coalition maintenance, status-seeking, intergroup conflict).

Otterbein (2004) states that physical and ethnographic evidence sustained intraspecies killing – whether due to war or not – in the Upper Palaeolithic, reaching a peak in big game hunting societies and was later reduced only to reappearing after the onset of agricultural farming and property. Multiple burial sites would suggest warlike encounters, though assigning ancient data to warlike events has been challenged by Haas and Piscitelli (2013), who doubt the presumed universality of warfare in human history and ancestry. However, the prehistoric cemetery site – 61 skeletons, of which 38 show signs of trauma, with associated pointed stone projectiles – at Jebel Sahaba in the Nile valley dated around 13,000–14,000 BP has been cited as the oldest known evidence of probable warfare or systemic intergroup violence (Kelly 2005).[1] Additionally, ten of the 12 skeletons of prehistoric hunter-gatherers found in Nataruk (located near the reconstructed margin of the late Pleistocene/early Holocene Lake Palaeo Turkana) aged between 9,500 and 10,500 BP showed evidence of violent death. As stated by Mirazon Lahr et al. (2016a), evidence suggests that warfare was part of the repertoire of intergroup relations among prehistoric hunter-gatherers.

Thus, humans would have been empowered by basic animal drives of ancient origin but behaviourally enriched by interactions with continuous instrumental, tool-making, and strategic material development. These drives aim to seek survival based on territory, dominance, feeding, and reproduction and add an incredible disposition for creativity and social deceiving strategies in seeking

adaptation, power, and profit (advantage). This implied a cocktail of interactions aimed at moulding some of those drives and progressively constructing conditions for ongoing social construction changes. Neuroplasticity – a property of neural tissue to modify connectivity and dynamic aspects of neural function – would have been instrumental in redirecting or moulding some of the ancient behaviours acting upon neopallial circuits and subcortical connections, though not replacing the mentioned ancient drives cramped into more basal – and ancient – brain neural circuits.

For this reason – as shown through the history of our civilisation on how *Homo sapiens* deals with ancient warmonger animal drives – when these include domains linked to survival, power prevalence, or dominance, the involvement of highly potential destructive power of human technological developments may lead to a human paradox. In this regard, paraphrasing Renfrew´s *sapient paradox* (1996, cf. Colin Renfrew 2008), an increase in technological sapience development may not increase our species' survival probability but rather its demise.

Among humans, dominance is exerted through various mechanisms – emotional (religious), hierarchical, financial (corporative strategies), political, and military. Hence, the primaeval animal dominance drive has not disappeared from our human project; it has instead been masked or placed under an economic, political, or cultural disguise – e.g., religious and ideological fundamentalisms can express values that occasionally tend to culturally mask the involvement of dominance/prevalence drive, often acting through emotional domains. The segmentation in access to knowledge-informed decisions and creativity seems to create an ongoing balkanised human community. Let us add that physical and cognitive access to information is restricted/conditioned by economic, socio-cultural, and political reasons that generate "strata" of differential circulation and access to information.

Instead, we are witnessing the actions of human communities that have resorted to mystical, esoteric, or ritualistic approaches to overcome their relative handicap in the face of ecological or geo-climatic events, personal misfortunes, social marginalisation, or the belligerence fuelled by religious parochialism. Some of these tendencies contain the danger of fundamentalism, i.e., emotional dominance expressed in dangerous mystical depersonalisation and its potential transfer to an imaginary structure or to a leader or terrestrial proxy who embodies the final solution to their frustrations and unmet desires.

As mentioned earlier (Colombo 2019), based on social repression or "socialisation," cultural strata of variable "thickness" have been constructed on top of drives implicit in our animal condition. Nevertheless, it failed in their deactivation and succeeded only in reformulating or repressing them. Consequently, friction between these "grounding plates" – of biological and cultural origin – conditions various aggressive or maladaptive behaviours. In social construction, such evolutive concepts of territory and neighbour-to-be-suppressed ought to be replaced by cultural constructions thriving towards cooperative behaviour.

Behavioural adaptations involve the plasticity of neural processing. However, it must be stated that within neurobiological domains, neuroplasticity does not

represent a process with a unique, unidirectional, virtuous vector affecting brain/mind development. It could also respond to poor conditions due to the degradation of the brain/mind scaffolding, triggered by hereditary and developmental contexts as exemplified in environmental conditions imposed by poverty rates and distorted insertion in the social environment affecting education and opportunities for improvement (Colombo 2020a). In other words, neuroplasticity provides an opportunity for adaptation, offering a positive and a negative side (revision in Fauth and Tetzlaff 2016). That is, physical and social conditions of the environment during the child-rearing period affect brain development – at the microstructural and neurochemical level – as well as cognitive abilities and emotional behaviour in adult life. Under the said circumstances, the property of neuroplasticity that underlies mental processes and cortical organisation can result in an optimisation of brain processing, as well as in its impoverishment in the absence of adequate stimuli, depending on age and persistence of the generating conditions, i.e., depending on the presence or lack of cognitive and emotional contention and enrichment of the environment where it grows.

Besides cognitive impoverishment, nutritional factors are critical for normal brain and physical development. In this regard, the report from UNICEF 2022 crudely states that today in low- and middle-income countries, 2 in 3 children under five – or 478 million – experience food poverty, of which 202 million live in severe food poverty. As stated in the Foreword of this Report,

> We estimate that in 2022, the number of children suffering from severe wasting in the 15 countries worst affected by the crisis has increased at an extraordinary speed: one additional child with severe wasting every single minute.

Though each species in the world survives adapted to its environmental variables and physiological and physical construction – so that survival mechanisms and range of adaptability are not necessarily universal – a set of behavioural drive domains are universal. The latter includes survival (fight/flight behaviour), feeding, reproduction, and defence of individual – or kin group – ecological niche, depending on the goal, implying conditional cooperative or competitive strategies.

How much of our current behaviours – individually and as a global community – are driven by hidden, ancestral, inherited traits imprinted and practised during millennia in our animal condition?

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Response to Threat

However, not all are events of the conscious dimension. Cognitive processing involves distributed neural circuits as a substrate. Perhaps the most disturbing from an intellectual point of view is that much of the former appears to be at the subconscious level. As mentioned in Pierce and White (1999), psychological

mechanisms have their origins deep in the shadows of our ancestral past (cf., Sagan and Druyan 1992).

Among universal animal behaviours (including humans) is the response to threat. In contrast to a perceptible threat that may release freezing, fleeing, or fighting behaviours, abstract (virtual) potential threats elicit anxiety and vigilance and mould human thinking processes (Colombo 2019). These behaviours are intimately related to an ecological view of selective attention-demanding target selection and suppression of distractors, processes shared across animals from far apart taxa (Lev-Ari et al. 2022). Depending on the threatening level of the stimulus and neuroethological variables, it would differentially activate neural circuits beyond neopallium (prefrontal) and archipallium (hippocampus) structures to involve hypothalamic and mesencephalic circuits involved in ancient behavioural and regulatory survival drives (fight/flee, neurohumoral autonomic adjustments). The latter involves the recruitment of hormones and neuropeptide interactions, generating a neuroendocrine response.

In humans, anxiety triggered by such virtual threats frequently results in rituals that confer a sense of controllability and, thereby, a means to cope emotionally. Eilam (2005) states that humans and animals must respond appropriately upon encountering a perceptible life threat since a split-second decision can make a life-or-death difference. This split-second decision usually represents an adaptive defence response, which takes the form of freezing up, fleeing, or fighting back. Furthermore, Eilam et al. (2011) remark that repeated stereotyped ritual-like activity was described in a large spectrum of domestic, farm, and caged species, besides being present as a hallmark that can emerge in humans due to inferred threats to their fitness.

According to Boyer and Liénard (2006, 2008), ritualistic behaviour is the expression of a *Hazard Precaution System* directed towards detecting and reacting to *supposed threats* – different from *actual threats* that induce flight behaviour. Besides the complexity and intentionality of certain human rituals, the primary behavioural and neurobiological substrate would be analogous to those expressed in other mammalian species under distress due to potential predatory menace triggered by the *Hazard Precaution System*. In humans, with gestural redundancy and repetitive, predictable movements, ritualistic behaviour tends to confer a sense of control and anticipate anxiety-generating events for alleged potential threats (Eilam et al. 2011; Lang et al. 2015). This repetitive behaviour can be observed under social conditions in religious contexts and neuropathological circumstances.

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Violence

Our animal drives and cultural condition impose needs and trends in a continuous biosocial interaction, where cultural construction acts over basic biological demands and ancestral behavioural drives (competition for survival, territoriality,

reproductive trends, nutritional quality, hierarchical group standing in gregarious organisation***s***) that affects behavioural expression. Such "underground" animal-based drives condition our behaviour and become most manifest at times of crisis (e.g., survival menace, poverty, indigence, social marginality, belligerence, dominance, war) when ancestral basic survival/prevalence behaviours tend to be released from inhibitory control.

The existence of violent behaviour in the natural kingdom would be a consequence of three main basic drives – survival, feeding, and reproduction. Among mammalian and non-mammalian species, these drives pressed onto territorial or ecological niche demands. Pierce and White (1999) state that competition and violence (expulsion, damage, or physical elimination of the opponent) have been behavioural markers of most species in the natural kingdom, including non-animal species, such as vegetables.[2] This is based on the fact that territoriality and prevalence are universal domains in survival behaviours within the natural kingdom, based on territorial behaviours towards conspecifics, preying or rejecting those competing with feeding or reproductive resources (Colombo 2022).

In addition, evolutive human antecedents – linked to other primate species – are not foreign to basic behaviours in natural competence for survival or dominance. According to Patou-Mathis (2020),[3] the most ancient traces of violence found are those resulting from the practice of cannibalism. However, according to this author, this would have been a relatively rare practice – which appeared 780,000 years ago and has been documented in the Sierra de Atapuerca mountains in Spain – that persisted in other nomadic hunter-gatherer societies of the Palaeolithic age and among Neolithic agro-pastoralists.

In modern times, violence is exerted in different ways on various human domains – human rights, territorial disputes, religious and political fanaticism, and psychopathic behaviour – including abuse exerted by anthropocentric behaviours over the ecosystem. Thus, ancestral drives are moulded under diverse cultural contexts indicating human failure to replace – under pressing circumstances or dominance goals – the expression of violence by constructive behaviours (solidarity, shared interests, wealth distribution, educational access, ecological balance). Those drives converge to build *an evolutionary trap* expressed in such diverse domains as severe ecological degradation and climate disruption; constant competence for the development of instrumental means for aggression and dominance; worldwide wealth, health, and educational inequalities, with poverty rates impinging on individual cognitive and social domains; the sum of which place under siege all the favourable, constructive actual or potential profiles of our species.

As mentioned in Colombo (2020a), human potential requires a greater effort to fight poverty and illiteracy, allow access to cognitive development and knowledge, and feed creativeness during the early postnatal period related to the parental educational profile. Although the Council of the European Union declared 2009 as the year of creativity and innovation, this declaration will not be effective until improvements take place in prenatal parental education and

are also applied to all educational stages; it would also require the elimination of the profound social inequity and marginality. These measures would imply a profound cultural change and include raising collective awareness and striving towards needed changes. Furthermore, until we do not correct the cognitive-educational *fault* between socioeconomic strata to any appreciable extent, power and construction of future collective fate, endeavours, and perils will keep coming out of the hands of a relatively few, and knowledge will not have the desired collective insertion nor its adequate social response (Colombo 2021a).

In terms of proximate results, humans carry a combination of powerful abilities, such as cognition, technology, and Machiavellianism, that outcompete other species in the immediate survival horizon (since natural history only shows the impact of true winners when viewed in the long term), except for the risk of self-destruction.

Violence among competing animal species and other human tribes would have marked the history of our ancestors to dominate ecological niches and competing menaces. A *conditional trap* involves immediate and long-term effects through power dominance drives. These are expressed as inequities in the living and developmental conditions of our human species and in the survival of the ecosystem on which our species depends. Poverty, hunger, wars, freedom oppression, class prejudices, disparate wealth distribution, and corporate financial power place the power of solidarity, creativeness, and shared developmental conditions under siege. Other forms of social violence, e.g., wealth distribution and educational access, ride on top of social dominance.

Hence, our species' comparative advantages involve a survival risk represented by deviant expressions of those same domain threats (dominance, violence) that jointly set up *an evolutionary trap*, as will be further discussed.

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Notes

1 Due to poor collagen preservation at the site, data have been considered unreliable. Based on an alternative substrate, the apatite fraction, results suggest that the cemetery is at least 11,600-year-old confirming that the burial belongs to the Epipaleolithic, and due to diagenesis, the site may be older (Antoine et al. 2013).
2 https://www.ted.com/talks/stefano_mancuso_the_roots_of_plant_intelligence?language=es.
3 https://en.unesco.org/courier/2020-1/origins-violence.

3

GENE-CULTURE INTERACTIONS

Social and Environmental Conditions Influence Gene Expression

As House et al. (2013) suggested, gene-culture coevolution predicts that population-level variation in sharing and punishment is linked to demographic and economic variables. Further, the development of the concept of gene-culture coevolution evolved into a more comprehensive view of *reciprocal causation* (developing organisms are not solely products but are also causes in the dynamics of evolution) and *extended evolutionary synthesis* (retains the fundaments of evolutionary theory but differs in its emphasis on the role of constructive processes in development and evolution, and reciprocal portrayals of causation), according to Laland et al. (2015).

A species' adaptability and plasticity depend on various factors but are nourished by the possibility of expressing a range of physical and cultural phenotypes. Such freedom broadens the possible spectrum of the trial-and-error *game* that characterises the engine of natural evolution. The reduction in the degrees of ethnic and cultural freedom would make humans and their communities fragile by limiting their adaptive capacity and the eventual emergence of suitable and successful phenotypes in continuing to provide human civilisation with original approaches and solutions to their problems and needs.

Slavich and Cole (2013) propose that social and environmental conditions influence basal transcriptome activity via central nervous system control of neural and endocrine processes. Furthermore, as mentioned by these authors, social influences may also be involved in gene expression at a collective group level.

Besides the potential environmental impact on biosocial interaction, social and environmental conditions can affect gene expression and epigenetic processes – i.e., information that is not encoded in the nucleotide sequence of DNA, such as DNA methylation, histone (proteins of nuclear chromatin) modifications, RNA-based

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mechanisms, and thought to influence gene expression at the level of transcription – as mentioned by Gibney and Nolan (2010) and Slavich and Cole (2013). This concept supports previous evidence by Cohen et al. (2007) that social and environmental conditions can shape complex behavioural phenotypes and susceptibility to disease. Thus, the key to our future human profile lies in changes that we may be able to introduce in our socio-cultural contexts and their interactions.

> Unlike the genome, which is essentially identical in all cells of a vertebrate and stable throughout the life-time of an individual, the epigenome differs from cell to cell and is plastic, changing with time and with exposure to the environment (Jirtle and Skinner 2007; Szyf 2009a). The epigenome appears to be particularly vulnerable to environmental influences during certain stages of development (cleavage, perinatal period, puberty) and alterations in gene expression patterns induced at these times may persist for long periods, influencing the phenotype of the adult.
>
> *(Gibney and Nolan 2010)*

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Social Inequalities

Today it is not the phenotypic and cultural variety or difference that places our species' survival at risk but the imposition of proposals staging a unique, excluding, hegemonic thought – whether sociopolitical or religious. If we accept that the phenotypic and cultural variety is an inseparable part of the central engine of the adaptive capacity of *Homo sapiens*, current conditions constitute a flagrant transgression of such capacity. We generate a society where approximately one-third of the world population is practically in conditions of social immobility and homogenised by the deprivation of the elementary conditions for its development or of the conditions that motivate interest in it. This constitutes an immoral condition – if we echo a morality of solidarity towards others – and a counter-evolutive contingency to the extent that it contradicts the essential primary child support and reduces the potential genetic pool.

Korinek and Stiglitz (2018) suggest that the increased wealth of "capitalists" expand their ability to resist redistributions, reduce the progressivity of taxation or make it regressive, and induce firms to engage in more rent-seeking behaviour. This series of contingencies suggest that if basic human intelligence is made redundant, and the marginal product of human labour would fall below the human subsistence level if redistribution is deemed infeasible, society faces at least two alternatives of unknown long-term effects, either promoting artificial intelligence or allowing Malthusian forces to play out.

How and when did egalitarian-prone societies (as hunter-gatherers) evolve into stratified societies with the emergence of persistent institutionalised inequality? Within the open debate among anthropological and social students, Mattison et al.

(2016) analysed multiple factors, concluding that persistent institutionalised inequality, depending on resources brought about by Holocene climate stability, if coupled with sufficient resource patchiness or steep resource gradients. Authors add that when resources or new forms of wealth can be monopolised, such individuals (and their kin and allies) are poised to assert differential control of resources and use this over time to assume more permanent leadership positions and economic advantage. These authors add that coercion and dominance eventually fuel increasing inequality, particularly when subordinates have few alternatives.

Besides its hypothetical evolution, social inequalities persist under different sociopolitical conditions, with extreme wealth inequalities, as stated in the World Inequality Report (2022).1 The data show that the top 1% took 38% of all additional wealth accumulated since the mid-1990s, with an acceleration since 2020. According to this report, wealth inequality generally remains extreme in all regions.

Based on the following graph (Figure 6), the question arises regarding the current impact and implicit violence rooted in the profound inequalities in social and cognitive development and in wealth distribution, which rides on top of social dominance. As mentioned by Stiglitz (2015),

> … the financial crisis and inequality are intricately intertwined: inequality helped lead to the crisis, the crisis exacerbated already extant inequalities, and the worsening of these inequalities has created a significant downdraft

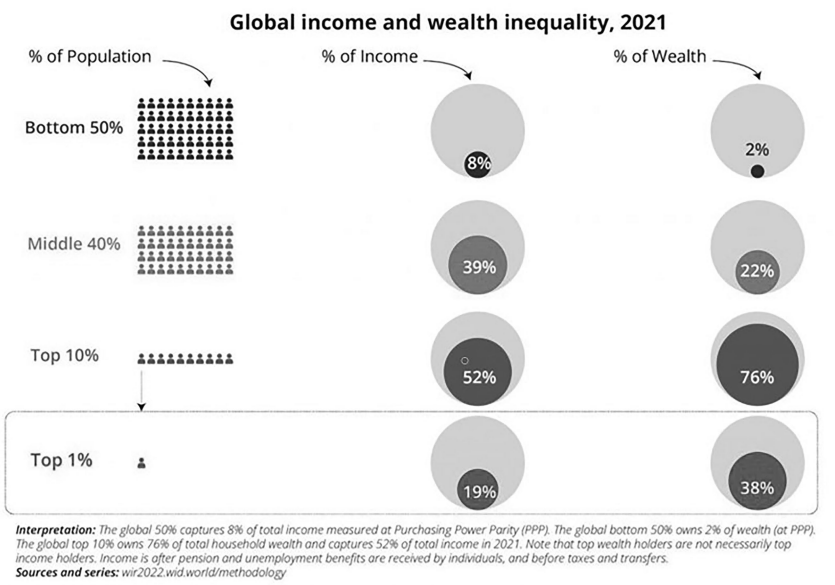

FIGURE 6 France-based World Inequality Lab published its latest World Inequality Report (https://wid.world/es/news-article/world-inequality-report-2022-4/).

> in the economy, making a robust recovery all the more difficult. Like inequality itself, there was nothing inevitable about either the depth or the duration of the crisis...was something that we did to ourselves; as with outsized inequality, it was the result of our policies and politics.

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Social Behavioural Network and Extended Evolutionary Synthesis

As Decety et al. (2012) stated, the representation of function across the neuraxis does not entail that lower-level structures are entirely subject to higher-level commands. A large percentage of neural processes occur without the engagement of neo-cortical structures. Indeed, higher-level cortical processing may be necessary only in situations with high ambiguity and low predictability, as posed by Parvizi (2009).

According to Maruska et al. (2013), social behaviours would be coordinated by conserved neural circuits that continuously evaluate the salience of observed inputs and contexts to produce appropriate behaviours. Sociogenetic interaction has a neural system counterpart in the form of a *social behavioural network* (SBN) involved in regulating a series of social behaviours, as earlier described by Newman (1999), who specified that the sensory stimuli that drive them express a greater diversity. According to this author, six limbic system areas are reciprocally interconnected anatomically, and neurons sensitive to gonadal steroids have been implicated in regulating more than one mammalian social behaviour. Following the same author, each of these areas is a potential node for a neuroanatomical network that regulates sexual, aggressive, and parental behaviours in both sexes of mammals.

These basal brain structures reciprocally connected belong to primal circuits in the evolution of brain organisation and encompass the lateral septum, medial extended amygdala/bed nucleus of the stria terminalis, preoptic area, anterior hypothalamus, ventromedial hypothalamus, and midbrain periaqueductal grey/tegmentum (Newman 1999; Fernald and Maruska 2012). According to Fernald and Maruska (2012), they form a *social behavioural network* implicated in regulating many social behaviours. These authors further mention that though they were initially identified in mammals, homologous regions have been found in fish, reptiles, and birds.

Additionally, social status has been shown to recruit neuronal representation within the human inferior parietal cortex (Chiao et al. 2009).

As mentioned by Goodson (2005), midbrain areas include the periaqueductal grey matter and several areas of the tegmentum, linking forebrain regions with motoneuron pools of the hindbrain. According to this author, the mammalian brain contains several other areas relevant to social behaviour, due to which Newman's network should not be considered as the complete social brain but its core.

Additionally, as Goodson (2005) reported, these circuits would control multiple forms of social behaviour, including aggression, appetitive and consummatory sexual behaviour, various forms of communication, social recognition, affiliation, bonding, parental behaviour, and responses to social stressors. According to O'Connell and Hofmann (2011), two neural circuits are crucial in this context: the *social behaviour network* and the mesolimbic reward system based on mammalian research. Furthermore, these authors found homology relationships for several of the nodes implied in these circuits, present in early vertebrates, based on neurochemical, tract-tracing, developmental, and functional lesion/stimulation studies.

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The basic idea of how to conceive evolutionary processes has generated productive interactions among biologists, perhaps reflected in the article in Laland et al. (2014b). It essentially poses whether there is a need to develop an *extended evolutionary synthesis* (Laland et al. 2015) or whether classical evolutionary theory should survive through a relentless synthesis, which has been how the field always has advanced. At any rate, progress on biological grounds during the last decade has accelerated the need to expand and integrate original views on evolution. Among other concepts, phenotypic plasticity, niche constructions, and extragenetic inheritance affect gene expression through epigenetic processes.

According to Laland et al. (2015), the *extended evolutionary synthesis* emphasises two unifying concepts of the evolutionary biology literature. They are *constructive development* which refers to the ability of an organism to shape its developmental trajectory by constantly responding to and altering internal and external states, and *reciprocal causation*, which captures the idea that developing organisms are not solely products but are also involved in evolution.

These concepts were essentially included by Bateson (2013) when stating that an organism's choices, its construction of a niche for itself, its adaptability, and its mobility have all played essential roles in biological evolution.

Based on several of these processes lies the concept that cultural and environmental epigenetics would impact the expression/inhibition of specific genes. Within this context, the concept of epigenesis involves that our extrapersonal world exercises significant biological effects on the molecular composition of our bodies (Cole 2009; Slavich and Cole 2013). In such a sense, it has been shown that the DNA does not always codify for protein synthesis and that it is possible to activate or inhibit the expression of genes due to social and environmental conditions (such as social isolation and inadequate maternal care). This occurs by affecting DNA methylation and changes in the histones that may affect activity and message transcription, thus generating potential long-duration or late effects (Weaver et al. 2004, 2006; Robinson et al. 2005, 2008; Szyf et al. 2008; Tsankova et al. 2010; Meaney and Ferguson-Smith 2010; Boyce et al. 2012; Fernald and Maruska 2012).

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Biological Impact of Social Hierarchies

According to Robinson (2008), social inputs, in addition to initiating genomic state changes, can also trigger lasting epigenetic modifications of the genome. Hence, social hierarchies have conditioned individual developmental conditions and social insertion.

According to Chiao et al. (2009), social status recruits distinct and overlapping neuronal representations within the human inferior parietal cortex. Social hierarchies emerge early during development, at approximately 2 years as mentioned in Zink et al. (2008) and play an important role in hierarchical rank and achieving accurate self-knowledge and self-improvement. Hierarchy is expressed as dominance in social animal groups (Colombo 2022) involving a series of privileges affecting feeding, reproductive, and territorial rights. Projected onto human social construction, it is expressed in socioeconomic status affecting education, health care, social standing, and mobility, as also expressed by Henrich et al. (2010) and Turesky et al. (2022).

Based on the above comments on genetic and environmental interactions, the impact of social hierarchies – subordinate or dominant – on physiological parameters in non-human and human primates implies the involvement of differential genomic expression. As Zink et al. (2008) mentioned, the more subordinate position in stable social hierarchies is associated with more significant stress. In contrast, the dominant position experiences the most stressors in dynamic hierarchies due to increased competition and instability.

As mentioned in Fernald and Maruska (2012), changes in social status have rapid and profound effects over very short time scales and radically alter overt behaviour and social insertion, as well as physiological, cellular, and molecular factors that regulate reproductive capacity.

The emergence of hierarchies has been linked to dominance-based status, as commented by Cheng et al. (2021), supported by evidence obtained from small-scale, forager human communities. According to these authors, despite strong cultural emphases on equality and respect for individual autonomy within the most egalitarian societies, dominant-prone individuals can prevail and gain deference, which would develop early without extensive learning.

Zinc et al. (2008) state that in humans, dominance has been linked to heritable personality traits with neuroendocrine and neurotransmitter involvement that would suggest the existence of biological systems that process social rank information. Serotoninergic and dopaminergic neurotransmitters would play critical roles in regulating brain circuitry associated with the maintenance, regulation, and reciprocity of social status, as stated by Pornpattananangkul et al. (2014). Hence, genetic polymorphisms that regulate serotonin and dopamine neurotransmission would contribute to the population variation in sensitivity and maintenance of egalitarian or hierarchical social interactions. In this domain, dominance – a component of social status – represents an ancient behavioural drive that affects species evolution and social organisations' dynamics (Colombo 2022).

It remains crimped to basal brain neuronal systems despite cultural strata constructed on top of drives implicit in our animal condition.

Von Rueden et al. (2008), based on research on small communities as one of the more acculturated Tsimane villages, Ton'tumsi, in Bolivia, provide information on the generation of social inequalities. The following excerpt is a partial summary conclusion of their comments,

> Over several generations, inequalities in income and privately held wealth may potentiate institutionalised status hierarchies among the Tsimane … Private ownership and intergenerational inheritance of wealth are primary inducements of social hierarchies that are institutionalised and polarised, i.e., social classes.
>
> *(Bowles 2005)*

Comparatively, in modern suburban, marginalised communities (slums), the urban acculturation process is followed by replacement based on local norms and values and the development of intracommunity hierarchical staging. Internal codes and values are usually self-generated, aside from those institutionalised in urban contexts. Usually, wealth, health standards, crime, education, jobless and drug commerce, and internal solidarity parameters do not compare with institutionalised urban settlements but thrive on spillovers from the proximate urban settlement.

On evolutive comparative grounds, social status[2] has been observed to affect neuronal activity involved in neuroendocrine regulation in a cichlid fish *Astatotilapia burtoni* (Fernald and Maruska 2012). In social species that form dominance hierarchies' as in males of the African cichlid fish that were allowed to rise in social rank compared to control stable subordinate and dominant individuals, showed brain neuronal activation in components of the *social behaviour network* and higher mRNA levels of immediate early genes (Maruska and Fernald 2011; Maruska et al. 2013). These authors concluded that rapid endocrine and transcriptional response suggest that the *social behaviour network* is involved in the integration of social inputs with the internal hormonal state to facilitate the transition to dominant status and improved fitness (Maruska et al. 2013).

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Notes

1 https://wid.world/es/news-article/world-inequality-report-2022-4/.
2 Meaning *status* as rewards, implying a hierarchy of privilege. High status entails greater access to desirable things. As defined by Henrich and Gil-White (2001).

4

ORGANISM-ENVIRONMENT AS AN INTEGRATED DYNAMIC SYSTEM

As previously considered in Colombo (2019), our species' biocultural origin has its roots in ancestral habits, behaviours, and survival drives through changing environmental conditions and crystallised during millennia in basic neurobehavioural circuits, be it as predators or potential prey. Thus, we were not born in a mother-of-pearl cradle and protected by magical agents. Placed on the thread of time, modern cultural contexts – norms, priorities, values – appear as "newly born." This biocultural interaction and "dystopia" carved our identity, genetic expression, and the possible origin of beliefs, resulting in an arch of possible behaviours and cultural phenotypes. Additionally, postindustrial societies became increasingly dependent on material consumerism and technological cultures to the point of "embraining" them, conceptually becoming technological hybrids. Does it represent a developmental "must" or an uncontrolled "spin-off" of human inventiveness affecting our future?

On the emotional dimension, the construction of virtual supernatural agents played a significant role in socialisation/domestication processes. This imaginary universe, reinforced by ritual behaviours, contributed to controlling personal/collective distress of various possible origins and conditioned our "degrees of emotional and cognitive freedom."

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A Stroboscopic View of Our Species' Evolution

Whether solitary or gregarious social habits, animals and vegetables (Baluška et al. 2020) show territorial behaviours towards conspecifics and prey on them or reject those competing with feeding or reproductive resources. *Homo sapiens* carries such a *backpack*, and it is culturally transformed, or hidden expression

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takes place as dominant behaviour and hierarchical social constructs, either spontaneously, under dynamic social circumstances, or transformed into virtual (cultural, ideological) domains. Its bonded relationship should be added with the continuously evolving sophisticated material culture that interactively evolves our collective mind and virtual constructions.

*

Homo sapiens' evolution is interactively wrapped around the construction of instruments of progressive complexity and power, developed into cultural–material technology that resets the relationships among individuals and between them and the environment. As mentioned by Herrmann and Tomasello (2012), humans are adapted for life in a culture, and the tools, symbols, and social practices of the cultures into which they are born enable them to construct additional cognitive skills for coping with the exigencies of their local environments.

An additional factor is represented by the ability to incorporate and pass cultural improvements to further generations (social learning), as discussed by Tomasello (1999).

> … many non-human primate individuals regularly produce intelligent behavioural innovations and novelties, but then their group mates do not engage in the kinds of social learning that would enable, over time, the cultural ratchet to do its work (Kummer and Goodall 1985).

Interestingly, Posner et al. (2022) found similar neurobiological components underlying learning among humans, monkeys, and rats, though with developmental differences in their brain representation.

> There is also evidence that all three species have a frontally based executive system that is active during learning and when there is conflict between responses (Washburn 1994; Weible 2013), but this network is likely much more developed in humans.

According to Patterson et al. (2006), the genetic differences among *hominins* do not always emerge clearly. Furthermore, according to Foley et al. (2016), *hominin* evolution was not an event of a punctate process nor gradual but the product of a complex interaction with variable rates of change depending on environmental dynamics and competitive interactions with other contemporary *hominins*.

As commented previously in Colombo (2019), in Africa, probably around 200,000–300,000 BCE, groups of anatomically modern *hominins* empowered with new fighting tools and strategies were competing for food and territory. During an extended span of years, their descendants migrated and spread throughout the planet and were probably phenotypically modified through ecological adaptations. They invaded territories already inhabited by other species *Homo*

(*H. erectus, H. neanderthalensis, H. denisovan*), and with whom it is possible they exchanged genetic material. Behind them, spread in time and space, remained fossilised remains of many species, either predecessors or phylogenetically related to the diversity of the genre *Homo*. Though their physical survival possibilities were exhausted, they probably intermingled with the genome and biological organisation of the new, prevailing species. Ahead in the evolving picture of our species' construction would lie traces representing a formidable, dispersed cemetery of previous survival trials and a sort of "genetic haze" in our evolutive trail.

As stated in a *Nature* editorial (2016), if we could mark the remains of all our ancestors, the world would be one enormous cemetery. Its full access would provide more evidence that the human lineage is more diverse than ever imagined.

As in all fields of scientific knowledge, there coexist different hypotheses, theories, and proposals; in this case, related to the possible "evolutive path" of the genre *Homo* and *sapiens* species. It is possible that during the extended period of probable genetic exchanges, our direct ancestor, *Homo,* would have been the *Homo erectus* or variants that emerged from it (*Homo antecessor* and *Homo heidelbergensis*). This long-lived species would have made successive migrations within Africa and towards the Euro-Asiatic continent, leaving enclaves later invaded in different regions by other *Homo* migrant species variants, including tribes of *anatomically modern sapiens* and Neanderthals. With time, such migrations and interbreeding, coupled with ecological adaptations, contributed to the generation of different phenotypes and ethnicities. In an editorial commentary of the journal *Nature* (2016), it was reported that the wide variety of hominids preceded our species, some occasionally cohabiting with the modern *sapiens*, thus forming a large collective. This was primarily relegated from the public understanding of the evolutive circumstances of our species' evolution and the transitions resulting from reductions in the demographic density of various lineages. Changes in primaeval demographic distribution could have propitiated the emergence or differential expansion of other lineages, generating transient stages in the extended period of *Homo* evolution. According to Foley et al. (2016), hominin evolution would neither be a simple punctuated process nor a constant gradual one, but a complex interaction between variable rates of change, environmental dynamics, and the competitive interactions of the *hominins* and their sympatric[1] fellow travellers in evolution.

*

New concepts regarding genetic-environmental interactions and their role in defining the phenotype have projected onto evolutionary biology concepts by which developmental processes are relevant to evolutionary issues. As described by Laland et al. (2014a), evo-devo interactions emphasise that developmental processes systematically channel the generation of phenotypic variants along specific pathways and thereby bias the direction and rate of evolution by, in part, determining the variants that are subject to selection.

Consequently, the interactions mentioned by Laland et al. (2014a) allow the expression of given genes and suppress the expression of others, thus generating the phenotype adjusted to new demands and facilitating the adaptation of future generations to the new environmental conditions or providing improved plasticity within given adaptation limits. Those authors refer to the need for evolutionary explanations addressing how existing developmental processes can produce novel phenotypic variants.

As Laland et al. (2015) comment, in the *extended evolutionary synthesis* (EES), developmental processes operating through developmental bias, inclusive inheritance, and niche construction share responsibility for the direction and rate of evolution, the origin of character variation, and organism-environment complementarity.

According to Müller (2017), the extended framework of the modern synthesis theory emphasises the role of constructive processes, ecological interactions, and systems dynamics in the evolution of organismal complexity as well as its social and cultural conditions. Thus, single-level and unilinear causation are replaced by multilevel and reciprocal causation.

The concept of reciprocal causation between organisms and their environment recognises being an extended matter of dialectic construction among biologists and anthropologists – e.g., see discussion in Richerson et al. (2010), Laland et al. (2014a, 2015), and Svensson (2017). One critical point is the biological limits to which this reciprocal causation could set aside the basic, ancestral neural constructions that allowed their survival and the corresponding behavioural expression.

It is known that under abnormal conditions, individuals or societies could terminate themselves or expose to self-destruction. Also, under strict circumstances (religious, sects, wars), self-immolation could be considered among humans as a valued behaviour. Perhaps the question is whether this terminal behaviour – or the emotional conditions that induce such behaviour – could be considered a deviation from a fundamental canon of evolution: survival. These circumstances – high emotional or hierarchical pressure – would cancel the basic drive of survival, i.e., a behaviour under given social structures could be considered exemplary but contradicts the core thread of evolution.

This brings up an additional dimension that has not been specifically tackled in the concept of *extended evolutionary synthesis:* the emotional dimension in the construction of behaviour. This dimension is an implicit component in behavioural decisions and adaptation. Its neural circuits are probably the most ancient (fear, dominance, and aggressiveness, inducers of fight or flight behaviours) in natural history – from simpler behavioural responses to sophisticated, more complex decisions in primate species involving personal or third-party risks. Temporary suppression of self-survival considerations may occur under critical demands, but that involves cancelling emotional responses or acting under emotional distress. Emotional neural circuits are involved in the evolution or adaptation of *fight or flight* responses, the basic options for survival in natural

history. It culturally involves self-esteem, kinship, or religious/mystic beliefs at the human level. How would they be integrated within the concept of *extended evolutionary synthesis*?

Adaptive phenotypic responses imply new genomic responses to new environmental needs. It remains to be determined whether they are limited to homeostatic (internal milieu and behavioural) physiological requirements or able to cancel ancient, universal drives (survival, territorial, feeding, reproductive, hierarchical social behaviours, fight/fly responses), integrated with basal (mesencephalic-subthalamic) brain circuits and reward systems. It should be mentioned that mechanisms contributing to energy homeostasis (such as feeding) overlap with the brain's reward system (Rossi and Stuber 2018).

*

Though diverse hypotheses and theories attempt to provide clues to understand the complexities of brain and mind development in *Homo sapiens,* according to Suryanarayana et al. (2020), findings suggest that the basic sensorimotor representation of the mammalian neocortex, as well as the sensory thalamocortical relay, had already evolved in the last common ancestor of cyclostomes and gnathostomes around 560 million years ago.

It would represent a basic blueprint for the development of the cortex, the basal ganglia, and the dopamine system – all the vital ingredients of integrative cerebral function, albeit with fewer neural elements and connectivity and probably lacking the complexity of neurotransmitter dynamics of primates.

Among the diverse hypothesis and theories regarding the development of the human brain and mind, they include ecological factors represented by increasing social complexity (Dunbar and Shultz 2007b; Dunbar 2009), a shift in feeding behaviour from herbivorous to carnivorous or omnivorous with the subsequent reduction of energy expenditure by the digestive system, allowing for the energy demands of brain growth (Aiello and Wheeler 1995), neurotransmitter involvement such as dopamine (Previc 1999, 2009), and culture (Colombo 2019). These proposals would not contradict each other but rather stress the complexity of brain and mind development, acting either at similar or (sequentially) different times. To the above, genetic modifications should be added, as mentioned by Rakic (1995a, b), Rash et al. (2016), Dorus et al. (2004), and Evans et al. (2004), involving ASPM (abnormal spindle-like microcephaly-associated protein). According to Evans et al. (2004), positive selection for the ASPM gene would have started around 18 million years ago.

Previc (1999) proposes a dopaminergic-based evolution of the cerebral cortex.

> By means of the regulatory action of dopamine and other substances, the physiological and dietary changes may have contributed to the vertical elongation of the body, increased brain size, and increased cortical convolutedness that occurred during human evolution.

As described by Dunbar and Shultz (2007a), the social factor implies not only population size but also the complexity of its social structure. Regarding the neocortex evolution, Rakic (2009) comments that, though its origin can be traced to reptiles, a uniform six-layered structure with radially oriented neurons first appeared in small mammals that emerged from their reptilian ancestors during the transition of the Triassic/Jurassic periods.

A complementary perspective to the above was proposed by Aboitiz (1992), that only later, in some mammals, the cerebral cortex played a significant role in increasing cognitive capacity, with the development of multiple corticocortical projection systems.

This, as critically stated by Parvizi (2009), refers to a predominant *corticocentric* bias regarding the mode of subcortical involvement in cognition and behavioural regulation. We know very little about the role of subcortical structures in these "higher" functions precisely because a significant proportion of current research has not equally inquired beyond the cerebral cortex. As Decety et al. (2012) stress, a comparative neuroanatomy study shows that motivating behaviours to provide care for offspring evolved earlier than complex cognitive capacities such as perspective-taking or theory of mind. In this connection, it is opportune to mention that the brainstem, hypothalamus, and limbic system – which play a significant role in the integration of affective value to incoming sensory signals – antedated the expansion of the neocortex.

*

Cooperation and Social Stratification

Thus, during a prolonged time, our species' evolution was marked by a series of interactive events (feeding habits, interbreeding among compatible *Homo* species, ecological environments and events, and survival rates) that affected the present outcome of our species. This multi-species *collective contribution* to define our species in its different ecologically adapted phenotypes drags an ancient collection of behavioural drives of universal character, including survival, dominance, reproduction, kin interactions within social groups, and aggression towards competitors associated with any of the mentioned drives. To this universal formula of animal development and community profile, each species incorporated relational menus that conform to social profiles (see Colombo 2022). In this regard, cooperation and competition are universal behavioural ingredients expressed within and between groups.

It is debatable whether cooperation depends on robust and innate reciprocity behaviour or is predominantly a consequence of a socio-cultural sharing demand, as discussed in Marlowe et al. (2010). Though experimental games do not replicate real-world conditions involving offers and counteroffers in this domain, they provide controlled comparative results subjected to further analysis. Applying the Dictator Game and Ultimatum Game[2] in a cross-cultural experimental

economics project, Marlow et al. (2010) concluded that results suggest that people in small-scale societies expect to get a fair share even when they do not want to give a fair share. This would be more consistent with demand sharing than with reciprocity. Such a demand for equity would explain the egalitarianism of hunter-gatherers.

*

It seems appropriate to insert a neurobiological comment that generalises processing internal and external milieu interactions. Under standard (stationary) living conditions, these are processed at essentially two evolutive different, though interactive, levels. These are the evolutive ancestral basal brain nuclei and related circuits (hypothalamus and brain stem) monitoring internal survival variables (homeothermic and internal *milieu* control, feeding, anger, reproduction, fear) and neocortical circuits involved in analysing internal and external variables and generating an organised behavioural response. Under standard conditions, the neopallium provides behaviourally adjusted responses to internal and external basic needs and demands through its descending and ascending connections. Whenever critical demands arise that risk individual survival, ancestral (subcortical) drives overpower neocortical control, and basic emotional behaviours are expressed as rage, flight, or attack. These are also expressed in social conditions under critical hierarchical or survival events, and so when dominance, or oppression, is at stake.

Based on neurobiological and neuropathological studies, emotional behaviour organisation includes components associated with violence (aggressive or defensive, actual or gestural) and territoriality. From the point of view of the social collective, the coalition for killing between neighbouring groups occurs regularly in various species (wolves and chimpanzees), attributed to the expression of the drive to prevail over neighbours. In humans, this intra- and intergroup competition expressed in a territorial domain or "dominance over neighbours" may be triggered by various reasons, whether religious, financial, ideological, or tribal-like parochialism. This generates zones of continuous tension and potential belligerence, formally like the continuous marking of territories with their rights over their food and reproductive exploitation by non-human animal species.

Our species' origin is not foreign to such a universal evolutive context but progressively developed a complex interactive environment of values, beliefs, and creativeness mounted on the ancient, animal, fundamental system of basic behavioural drives. This human cultural envelope has triggered expanded old-time behaviours to include potential collective and individual sociopathic behaviours that express themselves under various critical circumstances, such as power omnipotence or survival degrading conditions. Among them are those related to ancient drives in addition to the defence of values and beliefs, a combination that developed *an evolutionary trap* for human development that involves deviant-prone behaviours – if not sociopathic – as will be further considered in other chapters.

When human creations and their vision of the actual complexity of the physical universe overcome their capacity for understanding and incur out-of-bounds of the scientific domain, it resorts to magical or fantastic thinking and ritualistic behaviour. This sort of "emergency door" or "sidetrack" allows one to close "to satisfaction" those spaces still denied to its understanding and obliterate or decompress ancestral fears of the potential "danger" of the still unknown. As Boyer and Lienard (2008) stated, ritualised behaviour is best understood concerning a set of human precaution systems monitoring potential danger. Fear of the unknown, whether geo-climatic events or death and beliefs in animistic or supernatural agents transformed into religious *high gods,* triggered enduring inspirations in the arts and letters at the high cost of emotional and intellectual shares of our degrees of freedom. Beliefs in supernatural agents provide emotional inspiration and a sense of security but affect the intellectual freedom required to rigorously access the drive to attempt to understand life and our existence.

*

Environmental Influence on Brain Development and Behavioural Profiles

> Few tragedies could be less important than those that reduce life possibilities; few injustices could make more profound than negation to provide the possibility of attempting or have hopes due to limitations imposed from outside and falsely identified as innate of the individual.
>
> *(Gould 1996)*

Basic and applied research on neuroscientific behavioural grounds stresses the significance of early developmental experience, stimulating social environment, adequate early feeding and social condition of submissiveness and dominance, and having a moulding or imprinting power on the brain development and mental profile. As stated by Laland et al. (2010), regarding the genetic impact of environmental conditions,

> … human cultural practices have modified environmental conditions, triggering changes in allele frequencies.[12,13] In addition, analyses of data from the human genome have revealed numerous genes that have experienced recent positive selection, many of which exhibit functions that imply that they are responses to human cultural practices.[6–11,14]

The following paragraphs stress the species universality of early raising conditions affecting the probability of defining individual profiles (phenotypes) and social insertion. The relative openness or permissiveness of different sociocultural structures among the species suggests that the menu of variables involved will depend on the species considered.

Gould et al. (1997, 1998) and Kozorovitskiy and Gould (2004), following research in rats, obtained evidence that more new neurons were observed in the dentate gyrus (hippocampus) of the dominant males compared with both subordinates and controls, probably related to enhanced survival of new neurons. This would primarily depend on the social status of dominance rather than on environmental complexity.

Social status (dominance vs dependence) and stressful conditions involved in hierarchical social interactions affect neurogenesis in brain regions and in a series of physiological functions. As Beery et al. (2020) state, subordinate animals typically show elevated stress responsivity and long-term adverse effects of stress on their behaviour and immune, cardiovascular, metabolic, and reproductive functioning. The magnitude and severity of social stress can vary depending upon the degree of social competition within the group, which is influenced by factors such as the size of groups, the group composition, space available, and the despotism of the dominant individual.

This would be extended if not a universal event, at least among a series of species, as mentioned by Issa et al. (2012).

> Social status affects neurogenesis in rodents (Kozorovitskiy and Gould 2004) and crayfish (Song et al. 2007), neuronal size in fish (White et al. 2002), brain morphology in wasps (O'Donnell et al. 2007) and naked mole rats (2007), and cell receptor populations in crayfish (Spitzer et al. 2005) and fish (Burmeister et al. 2007). Social status also affects the serotonergic neuromodulation of synaptic responses in both crayfish (Yeh et al. 1996, 1997) and fish (Whitaker et al. 2011), and the excitability of neural circuits that produce different behaviours (Krasne et al. 1997; Herberholz et al. 2001; Neumeister et al. 2010).

The concept of universality regarding the impact of social status on the brain and behavioural domains is also supported by Goodson (2005), for whom the *social behaviour network* is a fundamental and evolutionarily conserved feature of the vertebrate brain. This network was initially proposed by Newman (1999), describing that circuits encompassing the medial extended amygdala and the medial preoptic area are embedded in a more extensive integrated network that controls not only male mating behaviour but also female sexual behaviour, parental behaviour, and various forms of aggression.

These concepts also apply to humans, where socioeconomic status – involving parental care and cognitive stimulation levels – during developmental stages affects brain performance development (Lipina and Colombo 2009; Hackman et al. 2010). According to Hackman and Farah (2009, 2010), neurocognitive systems would not be uniformly affected, among which language and executive function would be mainly involved.

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Notes

1 When two species coexist in the same geographic area.
2 The Dictator Game is a derivative of the Ultimatum Game, in which one player (the proposer) provides a one-time offer to the other (the responder). The responder can choose to either accept or reject the proposer's bid but rejecting the bid would result in both players receiving a payoff of 0. In the Dictator Game, the first player, "the dictator," determines how to split an endowment (such as a cash prize) between themselves and the second player (the recipient) that plays a passive role. From: https://en.wikipedia.org/wiki/Dictator_game. For further reading on this subject: Kahneman et al. (1986), Bolton et al. (1998), Achtziger et al. (2015).

5

SOCIAL DOMINANCE AND INEQUALITIES

The plasticity of human neurobehavioural construction and its neurobiological substrate are both responsible for the significant adaptability of the species to different physical contexts and modern community demands that involve material and emotional domains. Yet, its biological organisation sustains the genetic and behavioural inertia of adaptations to ancestral neurobehavioural construction demands involved with material and emotional survival requirements; they potentially could trigger sporadic imbalances with our current cultural constructions and demands and ecosystems. The latter does not cancel the ancestral plot of "instincts" – drives imprinted at the heart of our neurobiological organisation and its cognitive and emotional correlates. Part of our daily mental activity (conscient or not) is directed either to reconcile these innate tendencies with actual demands of the physical and social context or to repress them.

Hence, it is not enough to claim that our extended cerebral cortex mutes ancestral circuits embedded in subcortical circuits and programs; that its functional development and preponderance affect basic profiles of our species' behaviour. Basic principles of animal behaviour such as dominance, territoriality, competition, aggression, and survival with ancestral, subcortical circuits providing emotional scaffolding continue to drive the sophisticated behaviour of this new primate, which would finally express its dominance-prone in the updated form of national or supranational, oligopolistic, corporate political-financial organisations, and a spread of individual behavioural expressions. In parallel with them, we survive our most cherished human proficiencies in creativity and solidarity.

Whether solitary or gregarious social habits, animals and vegetables (see Baluska and Mancuso 2020) show territorial behaviours towards conspecifics and prey on them or reject those competing with feeding resources. Territoriality and prevalence are a universal must for survival behaviours in the natural

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kingdom. *Homo sapiens* still carry such a *backpack,* and its culturally transformed or hidden expression occurs spontaneously or under pressing circumstances or is transformed into virtual (ideological) territories (Colombo 2019).

Brain neural activity and connectivity, and mental activity constantly interact with environmental, emotional, and introspective domains. In this multivariate condition, sociality – relative positioning within hierarchical community structures, environmental and relational inputs, and feeding access – plays a significant role in brain and mental development and, to a significant extent, in individual cognitive and emotional profiles in adult life (Colombo 2022).

As stated by Eduardo Colombo (2013),[1] the current social structure amounts to the following:

> … an epistemological field built on the old archetype of submission, where the subject is subdued by the networks that weave the practices and discourses that condition it; let's say to be brief, a subject determined by the structure of the system.

The strength of our species resides in its creativeness, a profile often subdued by inequity, marginality, early domestication, and lack of access to information and knowledge in vast sectors of our world population (Colombo 2019, 2022).

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The Education Gap Eventually Transformed into Dominance

As stated by Colombo (2015), a decoupling or fracture of the integration of world communities will occur without education and healthy living conditions. Given the speed of change imprinted on scientific and technological knowledge and cultural sophistication, this decoupling or gap will deepen. Furthermore, the reality is that there are vast pockets of communities undernourished, impoverished, without access to essential health, an adequate education to the modern world and personal development, and – essentially – enslaved to the service of corporations or enriched power dominant groups, or condemned to degrees of material and social deprivation.

Regarding education on a worldwide account, according to a UNESCO report (2020),[2] one in four countries does not meet the critical finance benchmarks for governments, as outlined in the Education 2030 Framework for Action. It additionally reports that every year in the United States, of the $4.7 trillion spent on education worldwide, only 0.5% is spent in low-income countries, while 65% is spent in high-income countries, even though the two groups have a roughly equal number of school-age children.

The strength of our species resides in its creativity, a profile often subdued by inequity, marginality, early domestication, and lack of access to education,

information access, and knowledge in vast sectors of our world population (Colombo 2019, 2022). These social conditions have built a cultural gap that contributes to political and corporative dominance, which tends to generate misinformed, uncritical consumerists.

Humans have transformed through policies implemented by dominant corporations, its intraspecies dominance in a predatory culture over the opponent or different – be it of a social, ideological, financial, or religious nature. These aim to minimise or control competition, maximise a profitable market slice, and act on a collective receptor modulated by propaganda. In other words, to generate a consumer population subjected to the marginalisation of knowledge leading to programmable domestication of collective priorities and tendencies, minimising claims on the actual, basic needs for individual development. Under these conditions, the so-called "globalisation" is reduced to a communicational metaphor – limited to certain socioeconomic strata – in a world where approximately one-third of its population suffers from deprivation of the minimum resources for a safe habitat, health protection, and access to knowledge. True globalisation should imply global access to quality information and different domains of meaningful information. The above conditions are fully met only by a small fraction of the global population.

As mentioned in Von Rueden (2014), coordination problems in egalitarian societies include solving asymmetrical preferences of group members and labour roles aimed at achieving collective goals, involving punishing defectors, and rewarding high contributors.

As documented in a previous Chapter, there are universal conditions in which early raising profiles during development define or condition individual developmental and behavioural outcomes. However, according to Henrich and Boyd (2008), the menu of effective variables will depend on the species considered. They relate to early developmental conditions and socioeconomic status; additional events such as population density and generation of surplus are involved in the dynamics of social stratification and degrees of social inequalities. The menu of effective variables at the human level also involves socio-cultural and ethnic variations.

In looking for a universal social organisation among human societies despite their cross-cultural variability, they would share a common structural denominator or *deep social structure* (Chapais 2009). According to this author, a powerful conceptual model of humankind's deep social structure is the *reciprocal exogamy* described by Claude Levi-Strauss, a social arrangement in which groups are bound together through the linkage of pair-bonds and kinship bonds.

On evolutive grounds, as mentioned in Colombo (2019), within the primate order, according to Boehm (2012b), the ancestral evolutive predecessor to *Homo*, the chimpanzee (*Pan troglodytes*, or common chimpanzee) and the bonobo (*Pan paniscus*, or pygmy chimpanzee) would have lived in social constructions based on hierarchical dominance. Remarkably, there is a sharp difference in conflict

management exerted by chimpanzees (tendency to conflict, male predominance) and bonobos (preventive behaviour, female predominance). Based on the behaviours of both species, Boehm (2012a) poses that humans would keep both alternatives, a potential behavioural *Janus-face* with uneven prevalence distribution among individual characters and social organisations. This hypothetical behavioural duality could be linked to the configuration of the human genome and the subsequent neurobiological scaffolding. It would then be reasonable to expect that different basic tendencies could predominate in different groups of individuals, in addition to cultural conditioning. The expression of the final behavioural phenotype would, thus, depend on the ancestral behavioural dominance interacting with socio-cultural and socio-biological conditions.

Social stratification probably represents an early expression of the incidence of physical and behavioural individual profiles on group organisation, with different styles of interactive feedback across social human cultures and development. Its expression recognises a broad spectrum of histories and means and the associated level of hierarchical social stability, moulded by different institutionalised forms of *dominance*. It traverses various periods of human civilisation history. Perhaps the Bronze Age (approximately 3,300 BCE to 1,200 BCE) – probably radiating into Europe from Southwest Asia – represents one period in which rising elites of the European Bronze Age were hereditary, as analysed by Gilman (1981).

At the individual human level, the impact outcome of poverty and social marginality conditions on cognitive performance has been described (Colombo 2007; Lipina and Colombo 2009), a description that profiles the massive number of individuals not accessing basic or specialised educational levels needed in modern times to access qualified labour opportunities. Within the survival domain, the search for identity and shelter from insecurity was satisfied with nearby, materially accessible resources; distant, magical, mystical, or esoteric constructions; or with plain dissociation from traditional or prevailing cultural concepts and values. The sense of identity or belonging to an affective, cultural, and ecological "niche," the traditions and legacies that sustained the ties of that community, began to fade, evaporating from personal representations and collective memory. This emptying process was filled with a wide range of behavioural constructs.

World conditions regarding citizens' equal rights, culture, health, communication, and living conditions are described in international, governmental, and private reports (Colombo 2017, 2019, 2020a). Paulo Freire, in *La Educación como Práctica de la Libertad* (1969),[3] states the following concepts,

> Sólo en la educación puede nacer la verdadera sociedad humana y ningún hombre vive al margen de ella… la opción, por lo tanto, se da entre una educación para la "domesticación" alienada y una educación para la libertad. "Educación" para el hombre-objeto o educación para el hombre-sujeto.
>
> *(Translated from original by Ronzoni L.)*

> (Only in education can true human society be born, and no man lives apart from it. Therefore, the choice is between an education for alienated "domestication" and an education for freedom. "Education" for the man-object or education for the man-subject.)
>
> *(Free translation by JAC)*

As stated by Lipina and Colombo (2009), child poverty and development coalesce to construct a complex, multidimensional condition. Its study analyses biological and psychosocial components and processes within interactive pre- and postnatal domains.

*

Internet Access

A few institutional reports crudely describe culturally deprived conditions that deepen the existent cultural gap – not due to eventual free cultural decision. In "Levels and trends in Child Mortality," UNICEF (2021) reports that 58 million children of primary school age remain out of school, with most coming from marginalised groups. In addition, many children do not have foundational reading and numeracy skills, highlighting the massive challenge of achieving inclusive and equitable quality education for all.[4] Additionally, despite tremendous progress in the past few decades, challenges remain in reducing regional disparities and inequalities among secondary school-age students from different socioeconomic backgrounds.[5] Regarding internet access in young people, UNICEF (2021) reports that globally around 2.2 billion, or two-thirds of children and young people worldwide, do not have internet access at home, with substantial inequalities observed by socioeconomic backgrounds. The report further adds that globally, roughly 60% of the children and young people from the wealthiest quintile of their countries have internet access at home, while less than 20% of their peers from the poorest wealth quintile do. Even more alarming, it states that a further disaggregation by a country's income level reveals that internet access at home in low-income countries is nearly non-existent for children and young people in rural areas or from the bottom wealth quintile.[6] World internet users (2022) are shown in Figure 7.

Besides subtle improvements, the gap in early cognitive training has a long-standing history and still affects millions of citizens who cannot attain a competitive level and the needed awareness and informational access to cope with modern requirements. This lagging population will feed the increasing gap that impacts the future of individuals' lives, their community level, and our development as a world community. The individual and collective damage due to the education gap will have profound consequences on individual adaptation to social requirements and contribute to adult marginalisation and, consequently, loss of collective productive capacity. Hair et al. (2015) state that children living in poverty generally perform poorly in school, with markedly lower standardised test scores and educational attainment. The longer children live in poverty, the greater their academic deficits.

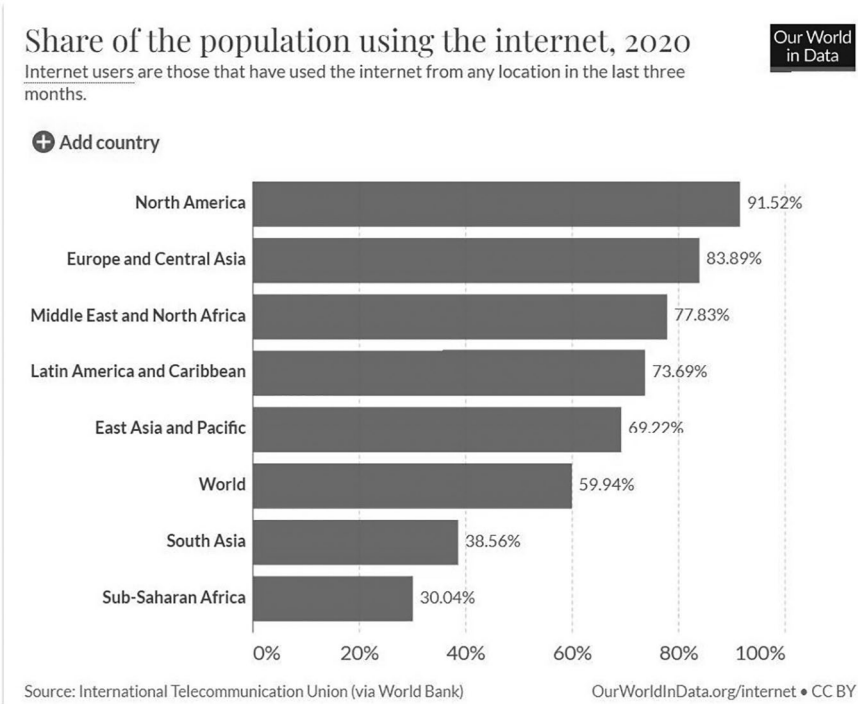

FIGURE 7 Internet users of the world by geographic regions (2020).
Source: Our World in Data (https://ourworldindata.org/internet).

These patterns persist through adulthood, contributing to lifetime-reduced occupational attainment. The influence of poverty on children's learning and achievement is mediated by structural brain development.

Until we do not correct the cognitive-educational *fault* between socioeconomic strata to any appreciable extent, power will remain in the hands of a relatively few, and knowledge will not have the desired collective insertion nor its adequate social response. As it will be described later, this socio-cultural gap represents the emergence of different individual and collective futures and the potential source of reactive behaviours and frictions among social components.

*

Poverty Rates

Social stratification in primate and non-primate animal species implies restricted or hierarchically driven inequalities in food access and reproductive rights. These fundamental, ancestral disparities persist as culturally supported inequalities when projected onto human social groups. This is a consequence of social designs based on cheap labour access due to financial and corporate goals or short-sighted populist

politics that continue in modern times. Equal rights are absent in hierarchically organised non-human animal (insects, fish, and mammalian) societies as they are still absent in several human societies. While non-human animal species acquire a dynamically stable social structure if leadership stands up to the demands, inequalities among humans represent one of the most frequent causes of social unrest and unstable political conditions. Until now, they seem to have only replaced the order of hierarchies, not inequalities. The latter may reach profound levels of human social and cognitive derangement that project sombre horizons on individual or collective development and insertion in the dynamic world social structures. Though some indicators would appear to have improved in the last 50 years, they do so at a pace that keeps formidable numbers of human groups displaced from modern advancements and improvements, involving disadvantages in the fight for social standing advances and cognitive development. Recent data from a UNICEF report iron marks the disadvantages for numerous human groups even though, according to the World Bank Biennial Report (2018), poverty indices show that income lower than US$ 3–5 per day affects over 1.5 billion individuals (Colombo 2019, 2021a, b). Among them, some consequences affect different biological and cultural domains, depending on the age at which it is imposed and the duration of the food and cultural deprivation. This significantly affects the probability of recovery – resilience – and productive reinsertion in a given social setting. This condition drags down the individual potential and the community to which it belongs.

The following issues should be considered in comparing poverty rates. Poverty statistic measurements and comparisons are usually based on the purchasing power parity (PPP), established by the International Comparison Program (an independent statistical program with a Global Office housed within the World Bank's Development Data Group). However, a series of restrictions should be considered in comparing poverty rates since the PPP exchange-rate calculation is controversial because of the difficulties of finding comparable baskets of goods to compare purchasing power across countries. It has been further considered that the estimation of PPP is complicated by the fact that countries do not simply differ in a uniform price level; rather, the difference in food prices may be more significant than the difference in housing prices while also less than the difference in entertainment prices. People in different countries typically consume different baskets of goods. Comparing the cost of baskets of goods and services is necessary using a price index. This is a difficult task because purchasing patterns and even the goods available differ across countries.[7]

> …This makes inter-country comparisons of per capita income based on PPP potentially misleading in that they do not properly reflect the actual material conditions of most of the people living in them.
>
> *(Problems with using PPP-based exchange rates)*[8]

A glimpse of the fragmented world conditions regarding poverty is provided by the World Bank Report[9] (containing variable yearly reports up to 2020) (Table 1) on the countries with the highest poverty rates in the world:

Poverty and income rates impact several developmental and cultural access domains. Among them is internet access. The following graph (Figure 8)[10] represents 2020 data regarding the percentage of children and youth aged 25 or below with internet access at home by country's income group as grouped by wealth quintile.

*

TABLE 1 Selected countries based on poverty rates

1. South Sudan – 82.30%
2. Equatorial Guinea – 76.80%
3. Madagascar – 70.70%
4. Guinea-Bissau – 69.30%
5. Eritrea – 69.00%
6. Sao Tome and Principe – 66.70%
7. Burundi – 64.90%
8. Democratic Republic of the Congo – 63.90%
9. Central African Republic – 62.00%

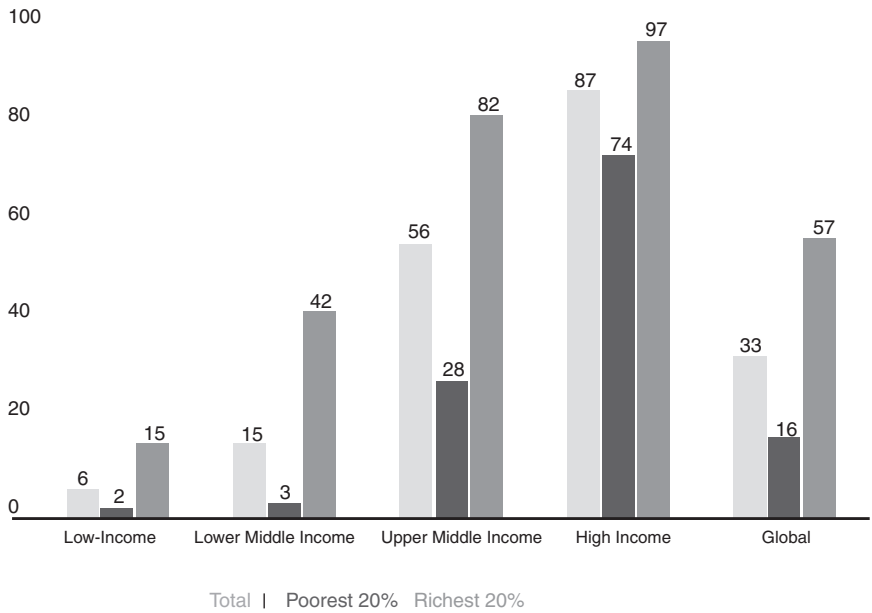

FIGURE 8 Percentage of children and youth aged 25 or below with internet access at home, by country's income group. Wealth quintile.

Source: UNICEF global databases based on Multiple Indicator Cluster Surveys, Demographic and Health Surveys, and other national household surveys, 2020. (Graph symbols indicated at the bottom of the *F*igure)

Wealth Distribution

One of the individual and collective "evolutionarily conserved" behaviours is accumulation. In the natural kingdom, this behaviour is linked to survival and associated with adaptation to seasonal variations in food resources. In human society, in terms of social psychology, the accumulation of goods – physical or capital – could be interpreted as an "evolutionally dystopic" behaviour.

As stated by Manstead (2018), as class divisions are based on wealth and social and cultural capital, an alternative approach is one that focuses on quantitative differences in socioeconomic status (SES), which is generally defined in terms of an individual's economic position and educational attainment, relative to others, as well as his or her occupation.

To place this matter into an evolutive perspective, it seems adequate to insert that wealth transmission and inequality were present in some hunter-gatherer societies, according to Smith et al. (2010). According to these authors, a primary constraint on material-wealth accumulation and inequality in hunter-gatherer societies is the degree of residential mobility, which is heavily influenced by resource variability.

> Global wealth has grown overall—but at the expense of future prosperity and by exacerbating inequalities, according to the World Bank's new *Changing Wealth of Nations* report released today.[11]
>
> The top percentile of wealth holders now owns just over half of the world's wealth and the richest decile 87.7 percent.
>
> *(Credit Suisse 2015)*[12]

> Since 2010, the wealth of this economic elite has grown by an average of 13% per year, six times faster than the salaries of working people who have barely increased an annual average of 2%. Between March 2016 and March 2017, there was the largest increase in history in the number of people whose fortunes exceed one billion dollars, with a new billionaire every two days.
>
> *(Oxfam 2018)*[13]

According to *Oxfam* (2018),[14] 82% of the world's wealth generated in 2017 went into the hands of the wealthiest 1% of the world's population, while the poorest 50% – 3.7 billion people – did not benefit the least from that growth. As reported by *Oxfam*, the world economy allows the richest to continue accumulating vast fortunes while hundreds of millions of people struggle daily to survive on poverty wages. This seems to represent a dystopic social behaviour derived from a primal animal behavioural drive of dominance.

According to the annual meeting (2019) of the *World Economic Forum*,[15] the wealth of the world's billionaires increased by 12% last year, while the poorest half of humanity, 3.8 billion people, saw their wealth shrink by 11%.

> A new billionaire was created every two days between 2017 and 2018. Meanwhile, the poorest half of humanity, 3.8 billion people, saw their wealth shrink by eleven percent. Just under half the world's population subsists on less than $5.50 a day – one school fee or medical bill away from falling into extreme poverty.

Concerning Latin America and the Caribbean, according to the same source, the richest 10% of the population holds 68% of the total wealth, and the poorest 50% only access 3.5% of the wealth. The fortunes of Latin American billionaires grew (2018) by 155 billion dollars. Such an amount represents almost twice enough to end poverty in the region for 1 year or reset labour opportunities.

The above data should be placed within abysmal differences in the national gross domestic product (GDP) as described in the following pages. A progressive, fast rate increase in technological advances reset cultural profiles differentially according to educational training. Hence, the proposed, assumed globalisation of information and knowledge without equal opportunities (as shown) to comprehend or apply it runs the risk of becoming an instrument for differential progress, promoting selected minorities. This deepens the *segmentation of humanity* in terms of quality of life, dominance, and educational level. The front-runners set the rhythm. The rest are either followers or are excluded, becoming marginals or dropouts or opting for other developmental directions, which may conflict with the front-runners. Generation of social marginals in non-human animal gregarious societies with a hierarchical structure reflects those derived from evolutionarily conserved behaviours representing continuity in human societies with constructs such as "poverty," "indigence," and "marginality."

As mentioned in Colombo (2019), in a gregarious community with a hierarchical structure in a species like ours, emerged the need to establish complex rights and priorities that derived into norms; that is, the institutionalised "fictions" mentioned by Harari (2014). This development resulted in further arrangements to distribute power, dominance domains, access to education, and healthy living conditions, which deepened the formation of social strata with comparative differences in the opportunities for individual growth and social ranking.

One additional question to pose in this context is whether relegated members of the troops of *Homo* or anthropoid primates or, later, of the primal *Homo* communities represented an archaic version of today's socioeconomic structure and marginality. That is an anticipation of what several centuries later would become "poor or dispossessed," "destitute," and "marginals" in modern human societies. These conditions are not unusual in gregarious animal communities with hierarchical structures.

The strong financial, cultural, and equal rights asymmetries among and within the countries' economies and the prevailing conditions or trends in territorial, commercial, or cultural prevalence – whether of populist, imperialist, colonialist, or corporate nature – turn hollow any attempt to attribute virtuosity to the current concept of *globalisation*.

According to the World Population Review, the Human Development Index (HDI)[16] value is determined by:

> … combining a country's scores in a vast and wide-ranging assortment of indicators including life expectancy, literacy rate, rural populations' access to electricity, GDP per capita, exports and imports, homicide rate, multidimensional poverty index, income inequality, internet availability, and many more. These indicators are compiled into a single number between 0 and 1.0, with 1.0 being the highest possible human development. HDI is divided into four tiers: very high human development (0.8–1.0), high human development (0.7–0.79), medium human development (0.55–0.70), and low human development (below 0.55).

According to the HDI by country in 2022, the world population is distributed as follows:

1. Very High Human Development: 1,579,834,351
2. High Human development: 2,992,380,845
3. Medium Human Development: 2,308,286,383
4. Low Human Development: 1,012,306,172

Hence, according to the figures provided by the average scores of the HDI, the distribution indicates that 4,572,215,196 citizens are in the *very high/high* segments of the world population, and 3,320,592,555 citizens are in the *medium/low* segment, representing 42% of the total. Considering only the Low Human Development population, it represents almost 8% of the world population. Once more, *globalisation* only applies to a world population stratum in terms of communication and other indicators, as specified.

Furthermore, according to a comparison of national global GDP based on data and estimates from the International Monetary Fund (IMF 2021), provided by *Visual Capitalist.com*[17]:

> Just four countries—the US, China, Japan, and Germany—make up over **half** of the world's economic output by gross domestic product (GDP) in nominal terms. In fact, the GDP of the US alone is greater than the combined GDP of **170 countries**.

According to the same source, the ten largest contributors to the global economy are (Table 2)

The attached Table 2 from the *Visua*l *Capitalist* of Global GDP (2021) provides a view of the crude reality of the grotesque worldwide financial imbalance in GDP by country. As stated, the USA and China represent 42% of the global GDP. This comparative description of GDP, coupled with the military budgets of those countries in addition to a few other European and Asiatic countries, and the distribution of populations living under US$ 5 per day, reveal the rampant inequalities in terms of

TABLE 2 Top 10 largest contributors to the global economy (according to the GDP, following IMF estimates as of 2021)

Rank	*Country*	*GDP ($T)*	*% of global GDP*
1	US	$22.9	24.4
2	China	$16.9	17.9
3	Japan	$5.1	5.4
4	Germany	$4.2	4.5
5	UK	$3.1	3.3
6	India	$2.9	3.1
7	France	$2.9	3.1
8	Italy	$2.1	2.3
9	Canada	$2.0	2.1
10	Korea	$1.8	1.9

Source: Visual Capitalist.com.

political and factual power and the feeble reality that represents the current concept of *globalisation*. Socio-cultural differences among worldwide communities and their constituents result from a different history and dynamics of interactive genomic-environmental human constructions; based on the impact of developmentally early cognitive and emotional environments. This further justifies limiting the current concept of globalisation to limited strata of the socioeconomic domain.

The above information is paralleled by the one from the World Bank (2017) on a global percentage basis.[18]

The above data coincide with the manifest *fragmented* condition of world affairs regarding national economies based on national GDP. These data, combined with those described in Colombo (2015, 2021a, 2022), confront the concept that we live in a truly globalised world and call attention to the driving sources of our human future based on financial, corporate, and military powers. Public policies are trapped within – or conditioned by – the mesh woven by those powers. This places a locked-in political decision against freedom and provides fertile ground for civil unrest. Moreover, the statistics regarding poverty income keep using an outdated, unrealistic base of US$ 1.90 purchasing power per day which flaws any conclusions drawn on the state of the world (see also Colombo 2007, 2015, 2019, 2021a, 2022). In other words, the concept of a globalised world hides its actual condition, where a large majority of its inhabitants dwell below the surface – at different depths of cognitive, wealth, and survival conditions – of financial dealings of corporate organisations and parental governmental institutions.

The following excerpts provide a summary of the profound worldwide inequality in wealth distribution.

> In 2020, the world gained **493** new billionaires—that's one every 17 hours.
>
> For the last seven years, New York City has been home to more billionaires than any other city in the world. However, last year marked a monumental

shift in the status quo. Beijing has unseated the Big Apple and is now home to 100 billionaires…Today's map uses data from Forbes to display the top 10 cities* that house the most billionaires.

*Beijing, NY City, Hog Kong, Moscow, Shenzhen, Shanghai, London, Mumbai San Francisco, Hangzhou.

Asia-Pacific's collective 1,149 billionaires are worth $4.7 trillion, while US billionaires are worth $4.4 trillion in total wealth.

Overall, it looks like the wealth tides may be turning as China continues to progress economically and more billionaires become based in the East over the West.[19]

The Global Footprint Network (2019) indicator (Figure 9) suggests a significant impact on the evolution of Earth's biocapacity of the corporate and national interests' policies, a trend that must be curbed by modifying current goals and policies. Corporate and national interests' voracity and greed behaviours are culturally fuelling a risky future, with an impact on the evolution of Earth's biocapacity, according to the Global Footprint Network (2019).

Niose (2011) defines the "phenotype"of corporate business goals,[20] stating that corporations are the only entities that have millions of dollars at their disposal for the sole purpose of defending their economic interests, shaping public policy, utilising

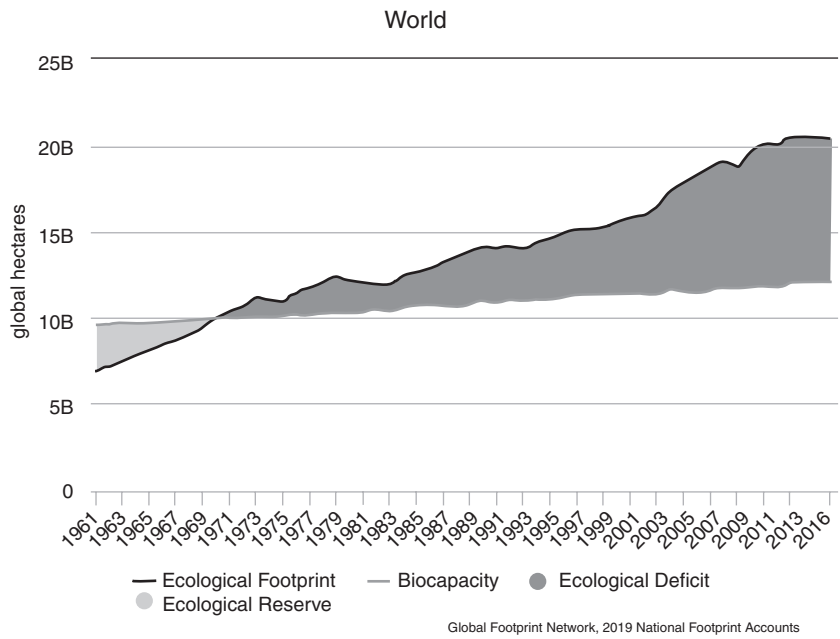

FIGURE 9 Relationship between biocapacity and ecologic footprint through time. Progressive ecological deficit.

Source: Global Footprint Network, 2019 National Footprint Accounts (https://bipdashboard.natureserve.org/bip_metadata/ecological-footprint).

the courts, controlling the media, and advertising themselves and their products. With vast economic resources, no moral sense, and the singular goal of making money, corporations act narcissistically as a matter of ordinary practice. Even when they act charitably, they do so as a matter of public relations and business interest.

As if dragged by his inertia, the humans are disrupting its planetary habitat ecosystem. The struggle for territory and consumption projects it towards devastation and destruction. The enemy has removed his mask and is now recognisable. The surprise never ceases to disturb: the enemy has always been in the same place, inside the human being. We are not part of an autonomous and independent species but symbiotic and interdependent. If we do not fully assume this concept, we will continue down the dark path of biological and cultural arrogance.

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Health Impact

Data in Table 3 describe, on a static basis, one major health issue in public health: the prevalence of anaemia in women of reproductive age due to the health and morbidity outcomes.

The following figures indicate the prevalence of anaemia according to WHO regions:

African Region 40.4
Region of the Americas 15.4

TABLE 3 Prevalence of anaemia in women of reproductive age 15–49 years (%) (WHO report 2021)

Highest lowest	
61.5 Yemen	8.5 Australia
59.0 Mali	8.7 Chile
55.2 Benin	10.2 Luxembourg
55.1 Nigeria	10.4 New Zealand
53.0 India	10.4 Canada
52.5 Burkina Faso	10.6 France
52.4 Gabon	10.9 Finland
50.9 Côte d'Ivoire	11.1 United Kingdom
48.8 Congo	11.8 United States
48.0 Guinea	12.2 Denmark
47.7 Haiti	15.7 Nicaragua
47.1 Cambodia	
46.8 Central African Republic	
45.4 African Republic Chad	
44.5 Angola	

Note: Disaggregated per country with highest and lowest indices of prevalence.

South-East Asia Region 46.6
European Region 18.8
Eastern Mediterranean Region 34.9
Western Pacific Region 16.4

The fragmented worldwide financial conditions in terms of GDP preclude assuring a genuinely global role in drawing strategies aimed at providing grounds for equitable wealth, health, and educational distribution and access. This impacts disentangling citizens' role from major decisions regarding world affairs. The latter is driven by an elite based on corporate, political power, and profit-seeking goals. Furthermore, mass media publicity draws public attention and goals towards a consumerist practice that deviates active interest and attention from major issues intimately bound to our shared future. The "public good" is usually a circumstantial added value conditioned by prospects of corporate revenues.

The winds that define the direction and speed rate of decisions affecting the worldwide future do not proceed from global cognitive development and welfare-oriented sources. Instead, it is decided by a financial, corporate minority moved by profit and able to mould *public needs* consciously and unconsciously via the media, somehow limited by occasional public unrest. While global indices regarding access to education, health, and living conditions improve slowly, profits from world minorities and Star Wars projects tend to increase exponentially. This implies a series of consequences in which a growing dominant minority deepens the social gap and our available capacity for freedom. The social state of the planet does not suggest a collaborative development but rather a markedly uneven, fractured one with large pockets of deep deficiencies. In this world of inequalities, disparate human rights, and developmental conditions, the future does not provide convincing arguments that we will evolve with similar opportunities. Moreover, everything would indicate that the cognitive-informational gap will get deeper.

*

Political (Dominance) Goals in Leading National Budget Expenditures

The corporate race has been launched mimicking animal dominance drive transformed into human dominance (profit, greed), for which it appears to be no restrictions besides corporate competition and consumer market limits. The following data on expenditure in different domains reflect the wide disparity in strategic power to deal with world issues.

The incidence of personal **wealth** and **spending** on **political** grounds has been exposed by Alzola (2012), focused on US grounds, as it states that to accomplish the goal of running for a Senate post, incumbents in Congress devote an estimated one-third to one-half of their working hours dialling for dollars in the run-up to the election.

According to Statista (2021) (Table 4), the value of **military spending** globally has grown steadily in the past years and reached US$ 1.92 trillion in 2019.

As reported by SIPRI (data for 2021), military expenditures by nation[21] are listed by the Stockholm International Peace Research Institute in Table 5.

TABLE 4 Countries with the highest military spending worldwide in 2020 (in billion US dollars) (*Statista*)

Country	*Military spending in billions of US dollars*
United States	778
China	252
India	72.9
Russia	61.7

Note: https://www.statista.com.

TABLE 5 Military expenditure by Nation (2021) (*SIPRI Military Expenditure Database*)

Rank	*Country*	*Spending (US$ bn)*	*% of GDP*	*% of global spending*
	World total	1,981	2.4	100
1	 United States	778.0	3.7	39
2	 China[a]	252.0	1.7	13
3	 India	72.9	2.9	3.7
4	 Russian Federation	61.7	4.3	3.1
5	 United Kingdom	59.2	2.7	3.0
6	 Saudi Arabia[a, b]	57.5	8.4	2.9
7	 Germany	52.8	1.4	2.7
8	 France	52.7	2.1	2.7
9	 Japan	49.1	1.0	2.5

(*Continued*)

Table 5 (*Continued*)

Rank	*Country*	*Spending (US$ bn)*	*% of GDP*	*% of global spending*
10	 South Korea	45.7	2.8	2.3
11	 Italy	28.9	1.6	1.5
12	 Australia	27.5	2.1	1.4
13	 Canada	22.8	1.4	1.1
14	 Israel	21.7	5.6	1.1
15	 Brazil	19.7	1.4	1.0

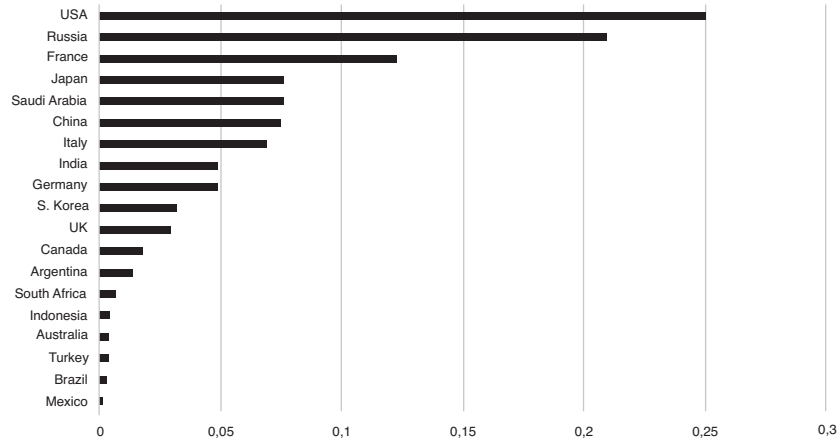
Note: List by the Stockholm International Peace Research Institute *2022 Fact Sheet* (for 2021) [1] SIPRI Military Expenditure Database [5].

The above data reflect the relative dominance power based on military expenditures, a domain that should be complemented by the national gross domestic product and financial exchange (commercial) capabilities. This dual-based power dominance confirms what has already been in practice regarding international cognitive and technological prevalence. It also preannounces the source of leading decisions on domains such as foreign national investments in the basic mineral and potable water needs, space exploration, contamination control, sponsoring world population affairs (education, poverty, labour resources), and political (institutional) intromission on foreign nations. Thus, in terms of dominance power, it seems an unfortunate concept to consider it a globalised world and not a segmented or disjointed world context, with segmented access to communication and comprehension of its contents. Under these circumstances, corporate and political dominance find a more accessible condition to exert power. The technological and outer space development disparity furthers the gap increment in profit options and dominance. For example, the Space Foundation considers that globally, the top three investors in the global space economy remained the same in 2020: the United States, China, and the European Space Agency. Collectively, these three entities constituted more than 81% of government spending in space in 2020.[22]

A comparative space budget spending shows (Table 6) the abysmal technological gaps among countries in this fiction of a *globalised* world.

In this context, comments by Etzioni and Etzioni (2018) ("*Humanity Would Be Better off Saving Earth, Rather Than Colonizing Mars*")[23] seem appropriate, as

TABLE 6 Government space budgets as a share of GDP (2020) (%)



Source: OECD, 2021.

Note: https://www.aa.com.tr/en/analysis/analysis-space-the-new-address-of-global-competition/2425107.

they state that what the droughts, the fires, the hot summers, and the melting glaciers call for is not an escape from Earth but a redoubling of the efforts to save it.

> [W]hat the droughts, the fires, the hot summers, and the melting glaciers call for is not an escape from Earth, but a redoubling of the efforts to save it… What is needed are major technological breakthroughs that will allow for protecting Earth while sustaining a healthy level of economic activity… To make such breakthroughs we need major concentrations of research and development resources, talent, and leadership, all of which are in short supply. Hence, any serious Mars endeavor will inevitably cut into the drive to save Mother Earth.
>
> As Ellen Stofan, former chief scientist of NASA puts it, "There is no Planet B." We object to the mission to colonise Mars. We believe that it is an incomplete solution to an unlikely contingency. The window of opportunity for us to work together to solve our planet's most pressing problems is closing, and we must act before it is entirely shut.

New developments and competitors place the world at risk even more, according to Eseceli (2021).[24] The report essentially denounced that Russia announced it successfully tested anti-satellite missiles in space for the first time, while Russia reminded that similar activities had been carried out before by the United States, China, and India. The report adds that this tension caused the space industry to grow dramatically.

It also has the potential military use of satellite communication technology, expressed in the following warning from Chinese sources, which reinforces the concept that technological advances are not foreign to dominance strategies,

> While Starlink claims to be a civilian program that provides high-speed Internet services, it has a strong military background, as well evidenced by the fact that some of the launch sites are built within the Vandenberg Air Force Base and the encrypted interconnection between the satellites and Air Force fighters has been included into their technical verification tests. As a matter of fact, Starlink has cooperated with American military many times. In 2019, SpaceX received funds from the US Air Force to test how well Starlink satellites can connect with military aircraft under encryption; in May 2020, the US Army signed an agreement with SpaceX on the use of Starlink's broadband to transmit data across military networks; in October 2020, SpaceX won a USD 150-million contract to develop military-use satellites; in March 2021, it announced its plan to work with the US Air Force to further test the Starlink Internet.[25]

Though the concept held that even military power growth is the only resort to avoid major conflicts among military powers, it places the world at an unstable equilibrium and generates a horizon of increasing destructive potential. Additionally, it reinforces profound inequalities among world nations, thus fostering a progressively unbalanced dominance in several human activity domains.

*

Human Trafficking, Slavery, and Child Labour

The collective construction of the socio-cultural ego lacks a clear awareness of its ancestral origin and avoids assuming its animal condition and behavioural drives.

According to a history report,[26]

> Slavery was relatively rare in pre-civilisation hunter-gatherer populations,[2] as it develops under conditions of social stratification.[3] Slavery operated in the first civilisations (such as Sumer in Mesopotamia,[4] which dates back as far as 3500 BC). Slavery features in the Mesopotamian *Code of Hammurabi* (c. 1860 BC), which refers to it as an established institution.[5] … Slavery was widespread in the ancient world. It was found in almost every ancient civilisation, including the Roman Empire. Both Christians and Muslims captured and enslaved each other during centuries of warfare in the Mediterranean.[6] … Beginning in the 16th century, European merchants initiated the transatlantic slave trade, purchasing enslaved Africans from West African kingdoms and transporting them to Europe's colonies in the Americas.
>
> … human trafficking remains an international problem. An estimated 25–40 million people were enslaved as of 2013, the majority of these in Asia.[7] … Evidence emerged in the late 1990s of systematic child slavery and trafficking on cacao plantations in West Africa.[9]

> Slavery in the 21st century continues and generates $150 billion in annual profits.[10]… In 2019 there were an estimated 40 million people worldwide subject to some form of slavery, 25% of them children.[10] Sixty-one percent[nb1] are used for forced labour, mostly in the private sector. Thirty-eight percent[nb2] live in forced marriages.[10] Other types of modern slavery are child soldiers, sex trafficking, and sexual slavery.

A crude picture of modern human trafficking is provided by Nigeria's current conditions, as denounced by Okeshola and Adenugba (2018). According to these authors, the underlying crime of human trafficking is that globalisation has created inequalities and inequities, resulting in the migration of the poor to the rich regions of the world. These conditions are further discussed in the *Trafficking in Persons report* by the US State Department (2022) and by Horton (2022), according to whom,

> The first British slave-trading expedition was in 1562. Between 1680 and 1786, over 2 million enslaved people were transported. The vast profits that accrued financed the Industrial Revolution.
>
> The advances in science and medicine between 1680 and 1807—the foundation of the medicine we enjoy today—owe much to the wealth created by the slave trade. British medicine is built on the tortured corpses of enslaved African people—a truth we have eliminated from our mythic history.

In perhaps somewhat subtle ways, current underpaid employment, unemployment, education gap, poverty, and marginalisation create conditions that affect human self-esteem, health, progress, and a continuing widening gap with contemporary requirements to become actively inserted in modern society developments. Thus, under such conditions, citizens become prey to or manipulated by corporate and political slogans, unscrupulous merchants of drug dealing or organ transplant donors, and forms of slavery.

On a worldwide account, in 2016, there were an average of 5.9 adult victims of modern slavery for every 1,000 adults and 4.4 child victims for every 1,000 children (Figures 10–12).

Additionally, 40.3 million people were victims of modern slavery. The prevalence is highest in Asia and the Pacific, where 4 out of every 1,000 people were victims, followed by Europe and Central Asia (3.6 per 1,000), Africa (2.8 per 1,000), the Arab States (2.2 per 1,000), and the Americas (1.3 per 1,000), as reported by global estimates of modern slavery by International Labour Office (ILO), Walk Free Foundation, and the UN Migration Agency.

According to the ILO, an estimated 40.3 million people were victims of modern slavery in 2016. Of these, 24.9 million people were in forced labour, and 15.4 million were living in forced marriage.[27]

Regarding child labour (see Figures 10 and 11), according to the joint report from the International Labour Organisation and UNICEF (2021),[28] working

children raised 8.4 million to a total of 160 million worldwide during the last four years. The study indicates that the world is not on track to eliminate child labour by 2025, as the Sustainable Development Goals proposed. To meet that goal, global progress would have to be almost 18 times faster than the pace achieved in the last two decades.

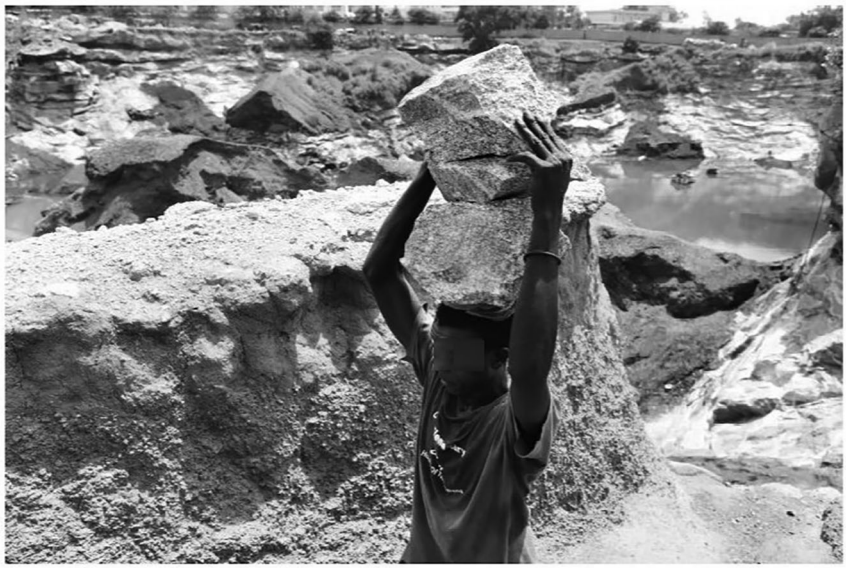


FIGURE 10 Child working in a mine in Burkina Faso.
Source: UNICEF (https://www.unicef.org/es/comunicados-prensa/trabajo-infantil-elevan-160-millones-al-alza-primera-vez-dos-decenios).

FIGURE 11 Children working in a mine in Kivu del Sur, Congo Democratic Republic.
Source: UNICEF (https://news.un.org/es/story/2021/06/1493112).

According to the ILO and UNICEF Report on Child Labour (2021), child labour remains unacceptably common today. At the start of 2020, 160 million children – 63 million girls and 97 million boys – were in child labour, or one in ten children worldwide, with significant variations across regions. Seventy-nine million children – nearly half of all those in child labour – were in hazardous work, directly endangering their health, safety, and moral development. Child labour prevalence stands at 24% in sub-Saharan Africa, three times that of Northern Africa and Western Asia, the region with the second highest prevalence. In absolute terms, the nearly 87 million children in child labour in sub-Saharan Africa are more than in the rest of the world combined.

According to the same source (Figure 12), without mitigation measures, the number of children in child labour could rise from 160 million in 2020 to 168.9 million by the end of 2022.

According to the latest Survey of Activities of Children and Adolescents (EANNA) (2020), in Argentina, the problem of child labour affects 10% of the child population. The latest data indicate that boys and girls between 5 and 15 years old who do some type of labour reached 760,000.[29]

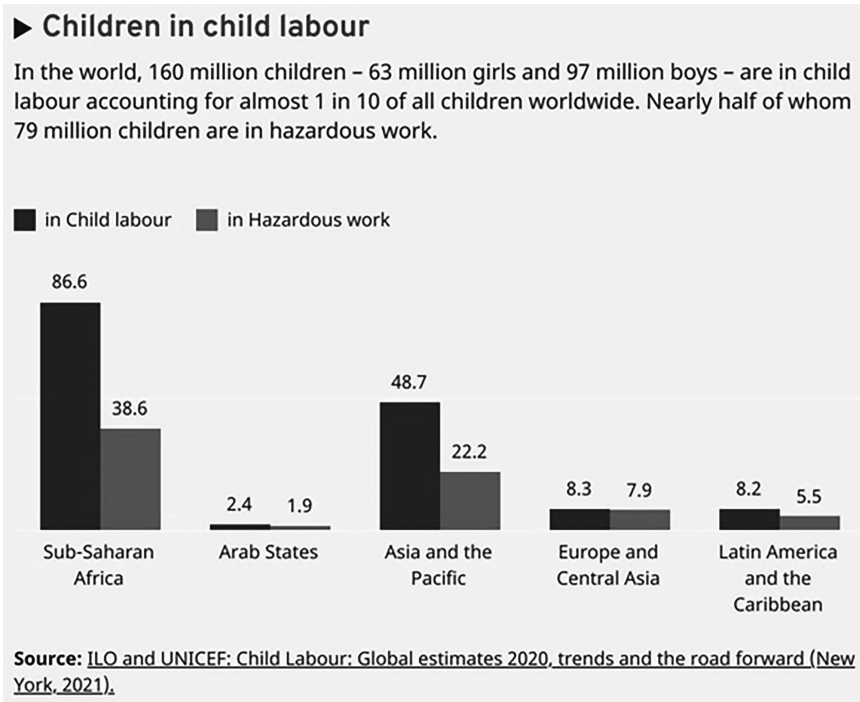


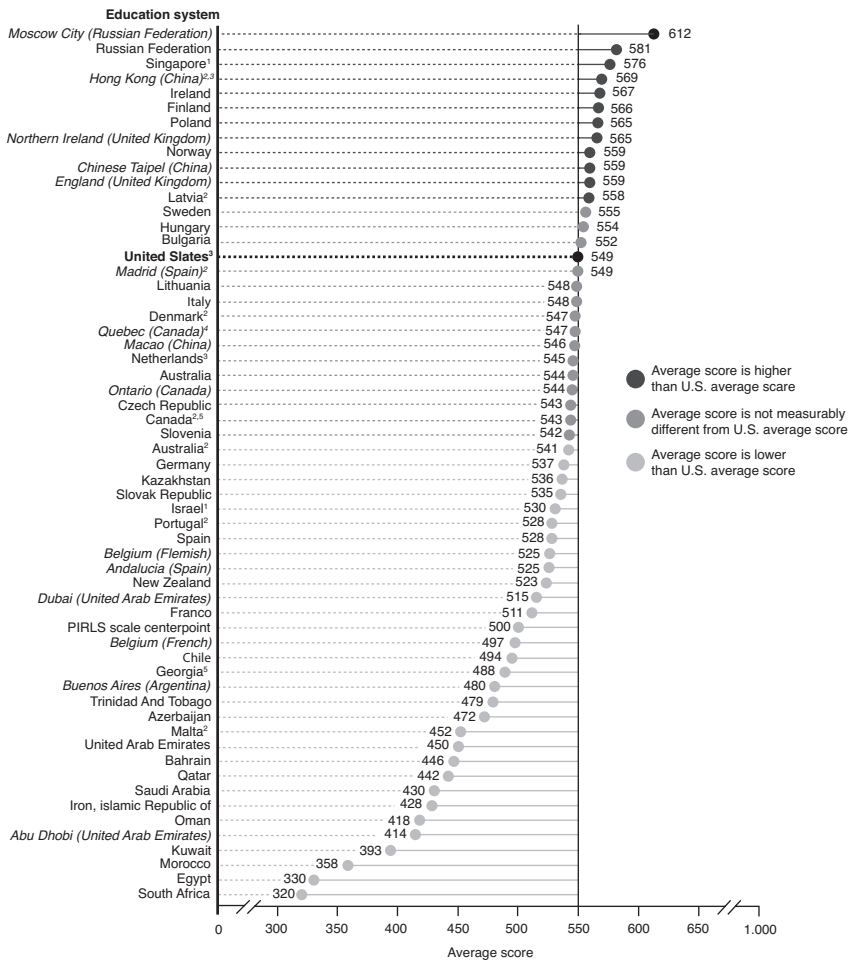
FIGURE 12 Children in child labour. Global estimates 2020.
Source: ILO (https://www.ilo.org/ipec/ChildlabourstatisticsSIMPOC/WCMS_817699/lang--en/index.htm).

Based on the Progress in International Reading Literacy Study (PIRLS) by the National Center for Education Statistics (2016), measures of fourth-, eighth-, and twelfth-grade students' performance in reading indicate the following comparative performance (Table 7):

Quotations refer to:

1 National Defined Population covers less than 90 percent of the National Target Population (but at least 77 percent).
2 National Defined Population covers 90 to 95 percent of the National Target Population.

TABLE 7 Average reading scale scores of fourth-grade students on PIRLS, per the education system (2016)



Note: https://nces.ed.gov/programs/coe/indicator/cns.

3 Met guidelines for sample participation rates only after replacement schools were included.
4 Did not satisfy guidelines for sample participation rates.
5 National Target Population does not include all of the International Target Population.

NOTE: Education systems are ordered by PIRLS average scale score. Italics indicate participants identified as a non-national entity that represents a portion of a country. The PIRLS scores are reported on a scale from 0 to 1,000, with the scale centerpoint set at 500 and the standard deviation set at 100. Education systems that did not administer PIRLS at the target grade are not shown. For more information about individual countries and assessment methodology, please see Methods and Procedures in PIRLS 2016 (https://timssandpirls.bc.edu/publications/pirls/2016-methods.html).[30]

On reading literacy according to *Progress in International Reading Literacy Study* (PIRLS) (2019 and 2021),[31] many children lack foundational reading and numeracy skills, and drastic disparities are observed both within and between countries (2021). It further states that although progress has been made in the past few decades, challenges remain in reducing regional disparities and inequalities among secondary school-age students from different socioeconomic backgrounds.

In terms of *literacy rates*, national indices (2015) are described in the following map (Figure 13) and show a vastly unequal distribution worldwide,

The figures represented are almost entirely collected by the UNESCO Institute for Statistics (UIS) on behalf of UNESCO, with 2015 estimates based on people aged 15 or over who can read and write.

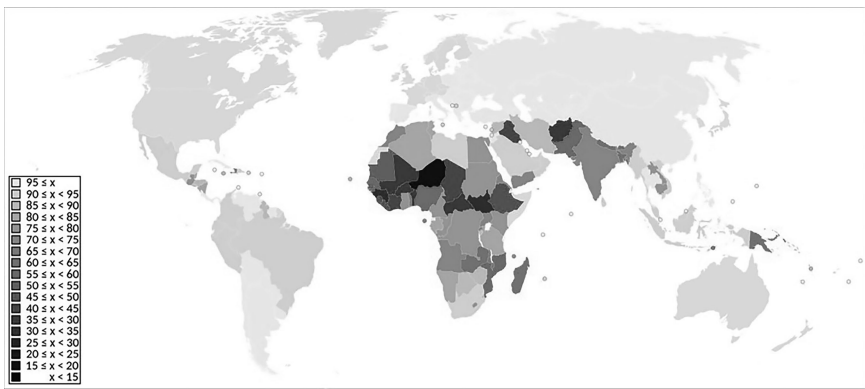


FIGURE 13 List of countries by literacy rate. x = literacy rate. Countries without data are light grey.

Source: UNICEF (https://data.unicef.org/topic/education/learning-and-skills/).

Angrist et al. (2021) measured *Human Capital* – resources associated with the knowledge and skills of individuals – using global learning data. *Human capital* is considered a critical component of economic development. According to these authors, global progress in learning has been limited, despite increasing enrolment in primary and secondary education. As mentioned by these authors, basic proficiency in mathematics and reading is markedly impaired in 6 out of 10 adolescents worldwide. The gap between schooling and learning is wide in developing countries.

Among other variables, it should be noted that according to the Report of the World Bank (2021), data can improve people's lives in many ways. However, economic and political factors typically prevent benefits from being shared equitably. Regarding women trafficking, the most relevant cases would be that of Niger and Angola, according to Akor (2011).

As mentioned in Colombo (2021), in essence, besides our species' creativeness and individual expressions of sharing and solidarity, our species carries a dark side that discloses aberrant or cruel behaviours unseen in the quest for survival in the natural kingdom, such as holocausts, condemning individuals, and communities to a life of slavery or ignorance and indigence; all for the sake of privilege, profit, or fundamentalist beliefs.

***

Notes

1 https://estudioslibertarios.wordpress.com/2013/04/11/entrevista-eduardo-colombo-2013/.
2 https://www.education-progress.org/en/articles/finance.
3 https://asslliuab.noblogs.org/files/2013/09/freire_educaci%C3%B3n_como_pr%C3%A1ctica_libertad.pdf_-1.pdf.
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5 https://data.unicef.org/topic/education/secondary-education/.
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11 https://www.worldbank.org/en/news/press-release/2021/10/27/global-wealth-has-grown-but-at-the-expense-of-future-prosperity-world-bank.
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25 https://gaodawei.wordpress.com/2022/05/25/prc-defence-starlink-countermeasures/; http://eng.chinamil.com.cn/view/2022-05/05/content_10152439.htm.
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27 https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/publication/wcms_575540.pdf.
28 Free translation from: https://news.un.org/es/story/2021/06/1493112.
29 https://www.telam.com.ar/notas/202006/475440-trabajo-infantil-una-realidad-silenciada-y-vigente-que-se-agrava-por-la-pandemia.html#:~:text=Seg%C3%BAn%20la%20%C3%BAltima%20Encuesta%20de,trabajo%20alcanzan%20los%20760%20mil.
30 International Association for the Evaluation of Educational Achievement (IEA), Progress in International Reading Literacy Study (PIRLS), 2016.
31 https://nces.ed.gov/surveys/pirls/index.

6

NEUROBIOLOGICAL AND CULTURAL *TECTONIC PLATE FRICTION*

The Build-Up of *Tectonic Plate Friction*

As stated by Hermann (2017), in addition to anatomical studies of groups of animals that show homologous structural features, vestigial structures, and embryological development, comparisons in contemporary species offer contributing factors towards an understanding of common descent.

Renfrew (2008), on the "sapient paradox," remarks on the gap between the human genome and the later, protracted, significant behavioural changes associated with most societies. Since the human genome was established at least in the past 60,000 years, the material and social contexts of human societies, which were the first effective around the time of the sedentary revolution, made their emergence and expression possible. The "sapiens paradox" refers to the time lag between the establishment of the biological basis of our species and the emergence of our novel *sapient* status or humanness, probably a product of the processes of socialisation and neuroplasticity.

In the previous account, it should be considered the differential susceptibility to changes (neuroplasticity) of brain circuits (whether related to neo- or archipallium or brain stem-diencephalic neural circuits, the latter involved with basal homeostatic and survival functions and basic behaviours).

Through centuries and millennia, the plastic nature (mostly neocortical and limbic circuits) of brain neural construction allowed us to build new interactive behavioural adaptative and creative cortical-subcortical neural substrate constructs. Its mental activity continuously self-corrected and included symbolic structures added cognitive levels implemented through external and internal language constructions, besides *unsymbolised thinking* (Hurlburt and Akhter 2008), i.e., the experience of an explicit, differentiated thought that does not include the experience of words, images, or any other symbols.

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It has been proposed that nonlinguistic thoughts represent a mental process shared by non-human animals, as stated in Bermúdez (2007):

> According to Michael Dummett (1993), the types of thinking available to animals are just a subset of the central types of thinking available to language-using creatures.[5] Dummett accepts that there can be nonlinguistic thoughts, which can be had both by animals and by language-using creatures, but he calls them "proto-thoughts".

Nida-Rümelin (2010) shares the concept stating that the view that emerges is that we might share larger parts of our cognitive phenomenally conscious life with nonlinguistic creatures than is commonly assumed.

Whether the development of specific mental processes was expressed or not, animal drives were progressively built and placed into practice since ancestral, primaeval times and crimped to human phylogenetically basic neural systems and basic survival behavioural construction. It plays a role in our social interactions and cultural constructions and plastically adapts to multiple behavioural demands. No wonder our species has been considered to have a bipolar behavioural profile (Boehm 2012a, b) attributable to common genetic lineages with the ancestral *Pan*, profiled by the behaviours of chimpanzees and bonobos, as described earlier. That is, besides the cultural-material environment and values that each ethnos has interactively developed for itself.

Human behavioural *Janus-faced* bipolarity has an uneven distribution among individuals and their expression in social organisations, conditional to individual and collective historical constructs and environmental domains. The question arises as to the *Homo sapiens'* collection of multiple possible genetic donors to the build-up of our species' genomic pool when considering the fragmented cultural profile of our humanity. This potential behavioural duality would be linked to the genome human configuration and the subsequent neurobiological scaffolding. It would then be reasonable to expect those basic tendencies to predominate worldwide with different rates among human groups, exposed to varying cultural conditioning that might enhance or dampen the expression of ancient drives. Thus, their future evolutive fate would depend on socio-cultural conditions and the impact of bio-social interactions.

Interaction with the physical and cultural environments continues to model our ethnic variations. However, our primary organisation is bound to ancestral demands imprinting a set of basic drives (territorial, reproductive, survival, secure feeding sources, dominance, threat response, and accumulative feeding behaviour). Their expression, affected by changed environmental (physical and socio-cultural) conditions, poses the probability of continued friction between the neurobiological and cultural tectonic plates, as schematically depicted in Figure 14 (from Colombo 2019).

Worldwide, the various ethnic and cultural systems express different profiles depending on how they reformulated, sublimated, and camouflaged basic

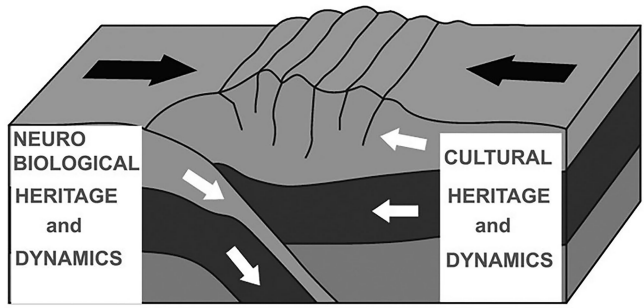

FIGURE 14 Schematic illustration of the metaphor representing the neurobiological and cultural *tectonic plate friction* as a source of adapted/non-adapted/pathological behaviours. Reprinted from *The Homo within the Sapiens*, *Preface*, page xxxiv, copyright [2021a] Jorge A. Colombo. With permission from Nova Science Publishers, Inc.

ancient behavioural drives. Thus, social interaction with those drives implicit in our animal condition has allowed the construction on top of them of cultural strata and behavioural profiles of various thicknesses and layers but failed in their deactivation, only in reformulating or repressing them. Because of such friction among these "tectonic plates," conditions are apt for various degrees of interaction, sometimes leading to aggressive or maladaptive behaviours and degrees of intolerance. Regarding human cognitive

uniqueness, as mentioned by Laland and Seed (2021), it does not arise from traits other animals lack but rather from trait interactions and feedback, with culturally scaffolded developmental experiences building upon and reinforcing evolved biological differences.

Among the animal kingdom, our comparatively overgrown cognitive abilities did not come without a high price in terms of behavioural patterns, cultural construction, and the expression of potential mental frailty (Colombo 2020a, b).

Fighting and killing for prey (feeding), reproductive or intragroup, and territorial defence purposes represent a universal profile in the animal kingdom. The question arises as to what extent has our neurocognitive growth affected the solution of current disputes in those same domains or our capacity to restrain conflictive responses. Looking at worldwide interactions, eventual restrain does not seem to emerge from values such as solidarity and sharing a common future but from financial and military comparative strength on conflictive or aggressive potential menaces, a rather primitive standing to dwell on cultural differences. This assures the continuous building of war technologies which maintains an unstable world equilibrium – with the implied continued menace of a worldwide catastrophe or cancelling of out-competed cultural expressions – as well as profound inequalities among nations' capabilities that foster international political dominance. This progressively impoverishes our species' potential cultural richness.

For a moment, let us put aside our species' creativity and solidarity expressed as our most desired profiles and look at its back side, i.e., of our individual and group competitive and conflicting behaviours. It has a long-term history of surprising cruelty expressed directly as an individual, a collective physical infliction, or as various power forms of cultural dominance (as partially illustrated in Chapter 12). Underneath lies a warmonger power profile resulting from the same drive; unaccountable years of evolution did not erase the ancient drives of dominance. Furthermore, institutionalised social and political constructions added new forms and strategies of educationally carving social priorities and desired individual and collective behavioural profiles and attempting to cancel the opponent via territorial conquest, strategic military and financial power positions, or technological developments.

It can be speculated that in remote times the continuous exercise of alertness, escape, and construction of security strategies for defenceless offspring and intraspecific competition have favoured the development of a brain and a mind with specific aptitudes, from which to generate increasingly sophisticated socialisation and survival strategies that conditioned our current behaviour. Hence, to what extent has our ancient history of exposition to crude environmental hazards, survival, and condition of predator and prey labelled basal brain circuits tinted or conditioned our current neurobehavioural constructions? What ancient behavioural inertias continue affecting our current behaviours?

*

Survival and Aggression on Neurobiological Grounds

On evolutive grounds, one basic behavioural drive is *survival*, which applies to all orders of human activity. As mentioned earlier, diencephalic and basal diencephalic circuits are involved in basic survival mechanisms, whether homeostatic of behavioural (see below). LeDoux (2012) discussed that survival circuits have their ultimate origins in primordial mechanisms that were present in early life forms. This is suggested by the fact that extant single-cell organisms, such as bacteria, have the capacity to retract from harmful chemicals and accept chemicals that have nutritional value. In comparatively more complex organisms, survival circuits are sensory-motor integrative devices that serve specific adaptive purposes. The core components of these circuits are highly conserved in vertebrates.

It is a consolidated concept that the body is composed of a highly integrated and dynamically interrelated system of multiple subsystems that sustain life. Attaining survival implies the coordination of dynamic circuit stages involved in defence, maintenance of energy and nutritional supplies, fluid balance, thermoregulation, and reproduction. Survival circuits were present in primordial organisms, suggested by the reaction of extant single-cell organisms, such as bacteria, to noxious stimuli. Multicellular organisms incorporated successive developmental domains, from receptors to complex neural nets bridging input

and output behaviour through motor effectors, which supported progressively complex behaviours. The natural evolutive continuity of survival coevolved with complex behavioural interactions with the environment so that beyond species-specific interactive contexts, there persist highly conserved survival neural circuits involved with feeding, defence and attack, reproduction, and internal *milieu* regulatory mechanisms.

One specific behaviour, *aggression*, could involve conspecific, defensive, and predatory outcomes depending on the context. At the human level, it is expressed in multiple forms, whether in social and political settings or acquiring unrestrained expression in sociopathic conditions – individual or collective – such as warfare. Hence, exploring some involved neural components and conditioners would aid in analysing aggressive human behaviour, which is not infrequent in our modern societies, often acquiring pathological expression, even under institutional consent (whether of political, religious, or social nature).

According to Flannigan and Russo (2019), aggression is an evolutionarily conserved behaviour that controls social hierarchies and protects valuable resources like mates, food, and territory. In most cases, aggression is a normal and necessary component of social behaviour. In humans, however, some forms of aggression are considered pathological behaviours.

At the human level, in institutional contexts, finding a reward following aggression is often related to the advantage or profit it would entail. In Machiavellian human minds dealing with territorial and political objectives, the reward is represented by an increase in political power or territorial dominance, as it is often manifested.

On neurobiological grounds, as described by Gregg and Siegel (2001), the medial hypothalamus and midbrain periaqueductal grey are the most important structures mediating defensive rage behaviour, and the perifornical lateral hypothalamus clearly mediates predatory attack behaviour. The hippocampus, amygdala, bed nucleus of the stria terminalis, septal area, cingulate gyrus, and prefrontal cortex project to these structures directly or indirectly and thus can modulate the intensity of attack and rage. The primary brain structures involved in expressing rage behaviour include the hypothalamus and midbrain periaqueductal grey; other limbic structures serve essential modulating functions.

As described by Gregg and Siegel (2001), the primary pathways underlying the expression of affective (defensive) rage behaviour arise mainly from the anterior medial hypothalamus and project to the dorsolateral aspect of the periaqueductal grey (PAG). The medial hypothalamus receives significant excitatory input from the medial amygdala. The outputs from the PAG that contribute to the expression of rage behaviour include pathways directed to the lower brainstem autonomic nuclei and somatic and motor nuclei.

According to Krzywkowski et al. (2020), the ventromedial hypothalamus controls both social aggression and avoidance, suggesting that it may encode a general internal state of threat modulated by space and experience. Additionally, social defeat induces a functional reorganisation of neural activity.

Their findings reveal how the hypothalamus dynamically encodes spatial and sensory cues to drive social behaviours. These authors argue for a reevaluation of the role of the hypothalamus in behaviour. Rather than being viewed as a hardwired, innate behavioural response region, the authors consider it should be seen as an integrator of present and past sensory and contextual information that adapts survival behaviours to a changing environment. These observations support that previous experience affects the activation of ventromedial and hypothalamic neurons, thus implying potential modulation of hypothalamic neural activation by previous experience. However, these basic neural components aim at survival, a universal domain in complex organisms, as expressed in simpler ones.

Yang et al. (2017) coincide with the need for a social setting to initiate aggression. According to these authors, territorial aggression in animals of other species inhabiting distinct ecological niches is responsive to social settings and prior experience in a species-specific manner.

*

Aggression: An Ancient Animal Drive Transformed into a Human Warmonger Profile. An Evolutive Perspective

Among gregarious animal communities, aggression typically occurs when basic survival requirements become scarce and under reproductive or hierarchical competition. As described in a previous Chapter (also in Colombo 2019, 2020), animal species' evolution implies a share of DNA units passed along successive generations and derived species, their expression moulded in interaction with local physical and social environments. These universal behavioural components within the animal kingdom (Colombo 2022) give grounds to the specific insights raised by Wrangham (1999) and Kelly (2005).

According to Wrangham (1999), research in recent decades has revealed that intraspecific killing occurs in a variety of species, commonly following patterns explicable by natural selection theory.

Kelly (2005) considers that the warlessness period of the Palaeolithic period is based on low population density and appreciation of the benefits of positive interactions with neighbours. It lasted until the cultural development of segmental forms of organisation engendered the origin of war.

The issue of when and how war-like struggles started in the *Homo sapiens* lineage is a subject of discussion among anthropologists (see Figure 15). The following statements by Kelly (2013) and Haas and Piscitelli (2013) provide an interesting view regarding aggression and warfare and recognise its expression in earlier species,

> Aggression appears in many species, suggesting that it has a long evolutionary history (Barash, chapter 2; Fry & Szala, chapter 23; Kokko, chapter 3).

FIGURE 15 Prehistoric warfare painting. Dated to the late Mesolithic, dubbed the "earliest surviving image of combat" (although no precise dating is possible). "Cave painting of a battle between archers, Morella la Vella, Cueva del Roure, Morella, Spain" (https://commons.wikimedia.org/wiki/File:Morella_%28combate-de-arquero.png). Neolithic archers. Rock painting from Cueva del Roure, Morella, Spain (Beltran 1982, cf. Christensen 2004).

More specifically, it is sufficiently common among primates that it is almost certainly a proclivity that goes back at least as far as a shared ancestor between humans and the other apes (Walker 2001; Wrangham and Peterson 1996). It is part of our behavioural repertoire, and at times serves us well. But perhaps just as common as aggressive behaviours are mechanisms such as threat and submission displays that limit the chance of injuries or death (Fry & Szala, chapter 23; Kokko, chapter 3).

(Kelly 2013)

Assuming that warfare has been a constant since the beginning of human history, based on the present, relieves us of responsibility for investigating the causes of war and the potential for peace.

(Fry 2007)

> Ultimately, we would argue that the root causes of warfare are to be found in demographic and economic pressures on specific populations at specific points in their respective history.
>
> *(Haas and Piscitelli 2013)*

Haas and Piscitelli (2013) draw attention to basing the concept of early war-like encounters based on ethnography and support the considerations given to growing population densities and resource availability prior to the Neolithic. They affirm that the archaeological record is not silent on the presence of warfare in early human history. Indeed, records would indicate that warfare was the rare exception prior to the Neolithic pressures of population densities and insufficient resources for growing populations.

According to Otterbein (2004),

> … warfare was possible and likely among early Homo sapiens. He argues from analogy with other primates, from Paleolithic rock art depicting wounded humans, and from rare skeletal remains with embedded weapon points to conclude that warfare existed and reached a peak in big game hunting societies.[1]

As described below, war-like or interhuman aggression conditions have been scrutinised based on the evolutive era. According to this source,[2]

> Of the many cave paintings of the Upper Paleolithic, none depicts people attacking other people explicitly,[7][8] but there are depictions of human beings pierced with arrows both of the Aurignacian-Périgordian (roughly 30,000 years old) and the early Magdalenian (c.17,000 years old), possibly representing "spontaneous confrontations over game resources" in which hostile trespassers were killed; however, other interpretations, including capital punishment, human sacrifice, assassination or systemic warfare cannot be ruled out.[9]
>
> The most ancient archaeological record of what could have been a prehistoric massacre is at the site of Jebel Sahaba (a prehistoric cemetery site in the Nile Valley (now submerged in Lake Nasser), committed by the Natufians against a population associated with the Qadan culture of far northern Sudan. The cemetery contains a large number of skeletons that are approximately 13,000 to 14,000 years old, almost half of them with arrowheads embedded in their skeletons, which indicates that they may have been the casualties of warfare.[11][12] It has been noted that the violence, if dated correctly, likely occurred in the wake of a local ecological crisis.[13]

Upon entering the Neolithic era, systemic warfare appeared to have been a direct consequence of sedentism as it developed. An important example is the massacre

of Talheim Death Pit (near Heilbronn, Germany), dated at the beginning of the European Neolithic, 5,500 BC. Investigation of the Neolithic skeletons found in the Talheim Death Pit in Germany suggests that prehistoric people from neighbouring tribes were prepared to brutally fight and kill each other to capture and secure women (Lee 2015).

In entering the Chalcolithic to Bronze Age, followed by the Iron Age, the introduction of bronze first and iron weapons next is associated with city-state fortifications and warfare encounters. The advent of agriculture provided a further base for military operations by securing agricultural surplus. A point to consider is that wars often result from a multifactorial equation, which would not arrive at a definition without the basic animal behavioural profiles tending to *fight or flight*, or to dominance/submission, considered behavioural universals. Human societies have progressively added additional components to social interactions, whether economic, ideological, political, religious, or corporate, making the equation less stable or predictable. As succinctly characterised by Gintis et al. (2015),

> … moral inhibitions are relaxed when ethnocentrism comes into play.

Beyond these brief historical comments on aggression behaviour and its correlation with technological or instrumental development and encounter probabilities due to changing relative human population density, the following concepts aim to place the discussion on a more ample scenario regarding survival and competence and the emergence of private property.

Though competition for food and reproductive rights has always been present in the animal kingdom – including group hunting strategies – humans developed a progressive means to secure it. Initially, either as active scavengers or hunter-gatherers, *Homo sapiens* must have had to defend their territory of hunting and gathering (their feeding parcel) and their prey from other *Homo* competitors present at that time depending on the world region and from non-human primates or non-primate animals as well. Therefore, they must have used fighting tactics and primitive instruments established around 400,000 years ago. Wooden spears 1.82–2.60 m in length that "resemble modern javelins" have been recovered from a site near the Schöningen brown coal mine in Germany (Kelly 2005). As stated by this author, based on the detailed reports on intergroup attacks and killings among free-ranging chimpanzee groups, the question is whether Palaeolithic *hominins* shared a convergent behaviour.

This leads to the question of how war should be defined to classify types of intergroup aggressions. According to Lopez (2017, cf. Bowles 2009), while some scholars prefer a more restrictive definition that requires a degree of social organisation and weaponry, others embrace a broader view of warfare, such as events in which coalitions of members of a group seeking to inflict bodily harm on one or more members of another group.

According to Flannery and Marcus (2003), new C^{14} dating from archaeological sites in Oaxaca, Mexico, supports RC Kelly's observation that intervillage raiding

may begin as soon as a region has segmentary societies. The oldest defensive palisade dates to 3,260–3,160 BP in conventional radiocarbon years, only a few centuries after village life was established.

Furthermore, as stated by Christensen (2004), primitive warfare was not considered very deadly since ethnographers observed that most battles were broken off when both sides had suffered a few casualties, perhaps due to their comparatively reduced population.

However, the deadly character (mortality) of primitive struggles was high, considering the small population size. As Christensen (2004) further states,

> The earliest signs of human aggression, in the form of traumas, come from the Palaeolithic, but they are few, scattered and often uncertain (Keeley 1996, 36f.). The oldest recorded case suggestive of interpersonal violence is a skeleton from Israel (Skhul IX), dated to the Upper Palaeolithic, which has perimortem injuries probably inflicted by a spear (Frayer 1997, 183). The earliest evidence of injuries possibly caused by warfare is from Jebel Sahaba in Sudan. Site 117 is a cemetery with 107 burials dated to the Late Palaeolithic (12–10,000 B.C.). Weapon traumas and projectile points imbedded in, or associated with, the skeletons suggests that about half the people buried at the site died a violent death (Wendorf 1968, 992f.). There is more evidence of mortal injuries caused by violence in the Mesolithic… Even though war was prevalent in the Neolithic there are regions or periods where the evidence of war is scarce or absent, indicating that some Neolithic societies were able to solve conflicts without resorting to warfare.

Due to the number of variables that could be involved whenever there is a lack of data, this conclusion seems primarily tentative.

Additionally, according to Kelly's (2013) statement (see also Šmit 2016),

> The earliest conclusive archaeological evidence for attacks on settlements is a Nubian cemetery (site 117) near the present-day town of Jebel Sahaba in Sudan dated at 12,000–14,000 B.P. (7, 12). War originated independently in other parts of the world at dates as late as 4,000 B.P. (13). Otterbein argues that agriculture was only able to develop initially at locations where ambushes, battles, and raids were absent (14).

And, as Glowacki et al. (2020) lucidly state,

> If, as many evolutionary anthropologists suppose, the roots of warfare extend deeper than the origin of our species, warfare is likely to have shaped the evolution of human psychology, including traits such as courage, risk-taking, parochial altruism, patriarchy and xenophobia (Alexander 1987; Bowles 2009; Darwin 1871; Wrangham 1999).

The above statements support the concept that since the dawn of *Homo sapiens,* dominance (to prevail in survival or reproductive goals) has been a manifest or latent behavioural profile, regardless of social construction. This profile was also expressed even earlier in *Homo erectus* that, at some point in their comparatively prolonged survival, would have developed basic tools to inflict damage or other behavioural means such as menacing gestural expressions or tribal outnumbering. Competition to prevail has been a long-standing animal survival behaviour. Thus, embrained in ancient basic neural circuits lie the behavioural scaffolding to prevail, subjected to prefrontal control of "gains and losses." This ancestral interactive behavioural profile involving survival and prevalence has trapped our evolution as a species, which persists underneath our cultural enclosures as our *evolutionary trap,* ready to emerge under any survival risk or crisis (whether physical, cultural, or ideological).

The development of property rights and social privileges would recognise ancient, primary animal tendencies expressed in communities with a gregarious organisation and hierarchical structure, expressed as territorial domains and community privileges or dominance ranking. The concept of "territorial domain" exercised by all animal species has probably been the evolutionary predecessor to "private property." However, we have seen that the origin is probably associated with the hierarchical organisation of gregarious communities in the animal kingdom. The emergence of the economic concept of private property has probably accelerated the process of institutionalising dominance and has also generated a new condition in constructing social hierarchies.

This process would be enhanced with the progressively increasing density of *Homo* tribes and perhaps most definitely with farming, with competitors progressively arising from the *Homo sapiens* herds. This probably perfected the sense of property or tribe privileges with possessions and set up the conditions for defined hierarchical structures, followed by competition and coalitions for land and produce, an additional source for *the evolutionary trap* that led to global war conflicts (see Appendix).

Hence, the concept of individual or collective private territory progressively projected onto more complex forms of defining it (neighbour, motherland, supranational corporations) and defending it, a progression of institutional, tactical, and instrumental (weapons) developments that evolved into increased wealth property and modern politics, as described in Gintis et al. (2015).

The following paragraphs provide a perspective of how the universal dimension of dominance leads to a manifest or latent condition of conflict as part of our *evolutionary trap.*

*

Social Impact on Brain Development

Previous considerations on gregarious animal social organisation reveal universal trends based on community hierarchies. They were described in insects, fish, and

mammalian – primate and non-primate – groups. Regarding the neurobehavioural impact of labour specialisation, the observations regarding brain allometry in insects made by Mares et al. (2005) on an increased division of labour are interesting. According to these authors, bumblebees are eusocial insects showing pronounced size polymorphism among workers, whereas size variation in honeybees is much less pronounced. Recent studies suggest that within a given colony, large bumblebee workers are more efficient foragers and are better learners than their smaller sisters; they show larger mushroom bodies (neuronal circuits) than honeybees. Bumblebees are more pluripotent and might require larger overall brain capacities than their more specialised relatives.

From the point of view of comparative biology, an interesting example of the interactions between environment-brain organisation-social behaviour is offered by studies carried out on some species of fish (Robertson 1972; Maruska et al. 2013). In them, the interaction between the composition of the social group and neurobiological-neuroendocrine aspects can be experimentally analysed. For example, specific communities are characterised by having a dominant male followed in the hierarchy by subdominant females. If the male disappears, one of the females reverses its sex to become the dominant male. Each species will express the impact of changes in the social ecology according to its functional and genetic characteristics. Species such as those mentioned have made it possible to analyse molecular and genetic "bridges" between the social environment and its biological configuration, which build a dynamic and interactive relationship. This example is included as evidence of the depth of social ecology's impact on brain organisation and behaviour, which will be expressed according to species characteristics.

As mentioned on other occasions, research on environmental enrichment conditions (see Chapter 1) impacts brain development and performance in several species, including humans (Colombo 2007, 2019, 2020a, b; Lipina and Colombo 2009).

While in the non-human animal kingdom, hierarchies were imposed following open challenges, and losers would either become submissive or ejected from the herd, Humans implemented highly creative means to obtain power (conquest, territorial, strategic or wealth possessions, and slavery), confessions, or control exerted over suspicious or openly defiant commons.

Besides political, social class, and militarily imposed conditions, the human socioeconomic status represents the closest concept to dominance hierarchy observed in non-human gregarious animals. According to Fernald and Maruska (2013), dominance hierarchies can take many forms, and in humans' socioeconomic status (SES) is the nearest approximation to hierarchical social rank. Status has been shown to dramatically influence the quality of an individual's life. In Brazil, Guimarães et al. (2014) affirm that,

> Even when socioeconomic conditions improved throughout life, self-rated health was associated with two indicators of remarkable experiences of poverty in early life. Our findings have shown a long-term impact of

extreme socioeconomic hardship during childhood and adolescence on the development of social inequalities in health.

*

The conceptual transition from *aggression* as a natural animal drive to the psychology of *human warmongers* inspires several theoretical approaches involving a broad spectrum. This includes universal behavioural components involved with territoriality, power, and dominance; ecological niches; population density; social structure; and evolutive neurobiological adaptations. The analysis of such a broad spectrum of potentially interacting variables precludes its discussion in the present essay. Some points relevant to these themes will be considered.

The universal survival drive involves basic, potential behavioural responses, such as fight or flight, dominance or submissiveness, and cooperation or competition in more human strategic terms. Even these are not foreign to gregarious convivence in non-human animals, suggesting that the behavioural menu has a limited number of options. Of course, Machiavellianism adds a behavioural dimension among primates and excels among humans. However, perhaps the main point to stress here is that there are limited behavioural responses in dealing with social and territorial demands or challenges or how to solve competition for profit or gain.

Specifically, regarding the behavioural concept of *concealment* or *war* between socially organised groups, perhaps the most salient comparative examples are those of the behaviour of chimpanzees and bonobos, as mentioned earlier. Given this evolutive sharing of behavioural bipolarity, it would not be surprising that its expression could have occurred early during human evolution because of competing instances related to territory, group leadership, social prevalence in access to nutrients, and reproduction rights.

In early human times, the low population density, probably rare tribe competitive encounters, and the more distended access to nutrients during its hunter and gatherer stage – fewer competing encounters and fewer with whom to share the food – would have reduced the probability of extended competition among groups. With the emergence of sedentarism and higher and more predictable crop yields, increased food availability impacted the reproduction rate and progressively increased demographic curves. Emerging social complexity promoted hierarchical social construction, increased birth rates, and increased competition for land and cattle herd rights. Subdivision of population groups combined cooperation with increased competition, and the race for dominance acquired a new profile: communal prevalence was swiftly replaced by hierarchical privileges and profit and the means to shield them from competitors. Progressively, conditions towards aggression and tribal prevalence with increased proficiency in armed tools production set up an unstoppable trend towards war-type encounters. One of the ancient drives in animal history, dominance, found conditions for a revival under more sophisticated competing paradigms. A conditioned web of alliances

and cons progressively invaded the social construction of human societies in terms of production, consumption, trade profit, and conflicts. Soon the invaded world was ready for a population explosion and expansionist, competitive adventures fed by the primaeval sombre menace of dominance.

According to Fry et al. (2013), war was rare to nonexistent under the conditions in which our species evolved but prevalent in more recent times that are dramatically different ecological and cultural circumstances. Fry and Szala (2013) add that there is a paucity of archaeological evidence for warfare in the Pleistocene, and several well-documented sequences show the beginning of warfare from previous warless conditions within the time frame of the last 10,000 years.

These statements would seem to contradict Boehm (2013) in terms of historical warfare development;

> One finding is that the roots of intergroup conflict were already in place 5 to 7 million years ago.

By then, the *bipolar ape* had developed and exercised one of its profiles. The other profile, coexistence, could be synthesised as mentioned by the same authors as "peace is positive reciprocity."

Positive reciprocity would engender cooperative behaviour. Fry et al. (2013) contention that *Human Nature* supports a new view of a kinder, less violent, more prosocial human nature appears to be an overstatement at the sight of past and current arms race development and the actual string of regional and potentially expanded wars, coupled with a degraded world population segment lacking access to modern health and educational conditions.

In this respect, as described by Reid (2004) (cf., Fry et al. 2013), amid the misery and ruin left behind by the 20th century's two brutal world wars, a group of Europeans set out to create a lasting peace on the continent and a shared economy.

Despite the plausible statements by Fry and Szala (2013),

> In territorial species, once boundaries have been established, threats and fights markedly decrease among neighbors (Bernstein 2007; Kokko, chapter 3, 2008).
>
> Certain mechanisms have evolved to promote the least costly yet effective forms of agonism in mammals and more generally in vertebrates. These mechanisms include (1) territorialism, (2) assessment prior to physical contact, (3) dominance relations, and (4) behavioural proclivities to "follow the rules" of restraint.

The consistency of this ending statement has been opposed by waves of migration of thousands of people lacking jobs and coverage – fleeing from impoverished, historically abused African countries and regional wars or economic collapse in countries of eastern Europe.

Fry (2013) addresses war instead of the expression of aggression – which tends to erase the historical territorial and reproductive fighting drives within the natural kingdom, including our species – when he states that,

> In territorial species, once boundaries have been established, threats and fights markedly decrease among neighbors (Bernstein 2007; Kokko, chapter 3, 2008).
>
> Certain mechanisms have evolved to promote the least costly yet effective forms of agonism in mammals and more generally in vertebrates. These mechanisms include (1) territorialism, (2) assessment prior to physical contact, (3) dominance relations, and (4) behavioural proclivities to "follow the rules" of restraint.

Thus, aggression represents an ancient drive that persists in the human species, and whether it conduces towards the action of war depends on its definition and added material components, strategies, and interactions of social constructs. Disparate financial and historical power development among Nations set up conditions for successive political and financial dominance. Hence, whether warmonger profiles emerge from our *Janus-faced* construction, socioeconomic constructs will ultimately depend on the preeminence of 1 of 2 ancient drives. That is, whether dominance and aggression overpower cooperation and "*entente*."

***

Notes

1 https://www.researchgate.net/publication/37716625_How_war_began.
2 https://en.wikipedia.org/wiki/Prehistoric_warfare.

7

SOCIO-CULTURAL BEHAVIOURAL CONDITIONERS. *THE EVOLUTIONARY TRAP*

The Concept of Collective and Individual Profit as a Primaeval Behavioural Drive in the Natural Kingdom

As stated by Price and Feinman (2010), society operates within this didactic tension between dominance and equality, hierarchical and egalitarian, and modes of behaviour that feature or privilege the group to those accentuating individuals.

Which and how much of our current drives – individually and as a global community – are driven by ancestral, inherited traits imprinted in our animal condition? Do our behaviours have an exclusive origin in the present socio-cultural experience and lack evolutive inertia? (Colombo 2019).

The origin of living and extinct species recognises an interactive process that involves habitat competence, intragroup dominance, survival of the fittest, and adaptation to physical and climate demands. These interactions secured a dynamic equilibrium in the ecosystem until *Homo sapiens* imposed its relative prevalence as a macro species and an array of means to secure profit from exploiting environmental resources. This single event rewound the clock of species survival and placed severe doubts on its endurance as an earthbound, integrated collective community. Scientific and technological development is expected to provide an ultimate solution for its misdoings, while religious ideologies attempt to provide fictional support to everyday people's insecure present and future; additionally, deviant behavioural pathologies ensued associated with social distress and marginality.

Urgent questions arise based on this perspective on whether and how strategies will return to solve actual basic needs and cognitive enhancement of ordinary people and deal with the interaction of ancient animal drives and cultural evolution in human societies. Institutionalised ideologies have gone from historically proposing revolutionary means to turn upside down institutional systems to

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generate war conditions with mass murder as a sequela or blatantly committing or allowing slow mass murder or individual physical and social handicap and cognitive impairment through conditions of poverty and social margination.

The human practice of torture, sacrifice, repression, and massacres due to political, military, and economic group dominance drives, religious competencies, and chronic poverty has labelled the human path throughout history. These events have built the obscure, ominous history path of human evolution. It left a trail of institutionalised homicides, whether generalised through wars or as individual tortures and killings under the mantle of supposed truth-seeking and invocation of the will of Gods under different beliefs or through political dominance regimes. Therefore, dissidents were either tortured, crucified, burnt alive, massacred, or condemned to social condemnation or exile at different periods in the history of our civilisation, as partially reviewed in Chapter 12.

Though killing has taken place throughout the natural kingdom due to territorial, reproductive, and feeding competencies – basically under survival and dominance drives – human brain capacity and mental and cultural evolution place ancient drives and human actions under different values and procedures. However, they recognise the basic domains of evolutive ancestral behavioural drivers in gregarious species: survival, dominance, and submissiveness. They constitute *an evolutionary trap* that has biased significant social interactions throughout human history, occasionally unravelling social unrest or revolutionary events and pathological social behaviours. They imply a significant handicap for any aspirations towards attaining a social system with equal rights, universal access to cognitive enhancement and education, and sharing adequate public health conditions. Often, Machiavellian constructions disguise social tensions and promote privileged well-being for selected sections of humankind. A fictional upgrade of people's sense of freedom, shared future, and promotion of technological and informational capacities hide not only the widening of the wealth gap – based on wealth transfer from the lower-income classes to the top 1%, as remarked previously – but also the progressive cognitive and informational gap that augurs different evolutive paths.

Previous concepts do not intend to ignore manifest human values such as solidarity and creativity but to place them under the prevailing mantle of basic human drivers throughout history: dominance, profit, and survival to the point that cultural values of creative minds products are absorbed, drowned into the mesh of commercial and profit prevailing web.

*

In non-human species, distress signals from youngsters, a call for help or solidarity, induce a prompt parental and group response, as shown from a neurobiological view by Platt (2002). This author states that a single sensory cue, such as the distress call of a juvenile monkey, can generate multiple different behavioural responses, depending on the context, learned associations, and memory

for the outcome of prior actions. In each situation, this selection of one out of several potential behavioural responses is often referred to as decision-making.

Neural circuits involved with the reward outcome involve various brain structural levels, as mentioned in Platt (2002); signals correlated with the reward outcome of events have been found in substantia nigra pars compacta, caudate nucleus, nucleus accumbens, in addition to the orbitofrontal cortex and cingulate cortex, which probably contribute to their attributes and behavioural value.

By projecting this example onto our human species, the question may arise under a different context. That is, mechanisms involved in decisions or actions of solidarity or altruism emerging under a *cultural call* of injustice in social settings with grave conditions of inequality in our stratified societies or when these events are part of political strategies or ideological arena. According to Henrich and Boyd (2008), a dynamic chain of social impact stems from the fact that more densely connected populations are likely to produce faster cultural evolutionary rates for sophisticated technology, complex skills, and knowledge. This would generate additional surplus favouring social stratification, allowing greater societal inequality to emerge.

The historical trend to allow political and corporate leaders to affect human doings and define common futures entered a continuous struggle for predominance, either for power or profit. This resulted in *sophisticated* means to manipulate – or menace – people's desires and needs to gain control over their demands and values depending on profit profile perspectives. As a terrible brief example that reveals the character of a social system based on financial profit, Goldman Sachs asks: "Is Curing Patients a Sustainable Business Model?"[1] This question is based on the fact that a successful cure would "exhaust the available pool of treatable patients" from a profitable point of view.

*

In an evolutive context, which and how much of our current drives – individually and as a global community – represent ancestrally inherited traits imprinted in our animal condition? In this domain, human prevalence is based on cultural development and complexity, which depend on the interaction of cognitive capacity, social communication, and cultural variables.

Natural history represents a continuous expression of drives characterised by dominance, seeking advantage, and a quest for adaptation and survival among its members and within ecological domains. These drives represent a standard component of living species in the natural kingdom. In this context, humans represent a complex outcome of fundamental evolutive pressures with an ample spectrum of cultural variants and sophisticated means that set up open confrontations. According to Smith (2012), differences should be stressed between "wars" among other species, as is the case for ants, considered as an instinctual behaviour mainly controlled by hard-wired responses to chemical signals, that ants do not have a foreign policy, and that their "genocidal annihilation" of neighbouring colonies bears little relation to Auschwitz or Rwanda.

Perhaps a daring side-comment to this remark should be made. This "collective colony behaviour" is expressed in trained human armies under extremely stressful – survival, prevalence – conditions such as war. Under those conditions, hierarchical executive orders conveyed utilising verbal conditioning to replace direct chemical signals active in other species. This implies the sad, implicit qualifier of humans behaving under given circumstances as colony ants do, such that genocidal annihilation suggests a regression to *colony behaviour*. Stretching this comment even further back on evolutionary grounds, it brings up examples of the ancestral, primal "quest for survival and prevalence" provided by research on single and collective bacterial adaptive behaviours and communication means, as mentioned in Winans and Bassler (2002), Waters and Bassler (2005), and Eickhoff and Bassler (2018). These authors provide clues regarding basic communication strategies observed among cells in multicellular organisms, the basic language of molecular and chemical interaction, and events that form the basis of the construction of living colonies and communities.

Considering our evolutionary ancestry and the evidence provided by shared, basic behavioural drives, our potential freedom – besides formal, institutional contexts – must overcome a series of hurdles, some deeply entrenched in our genetic construction. It means that as a species, we ought to repress, replace or control basic, ancient, evolutive drives before we can substantiate a new social future that involves individual and collective domains and the interaction of cultural differences. Accessible information based on human developmental conditions suggests that the success probability of this attempt would only be partially feasible within the worldwide human community. These conditions stage the harshly unequal present and future development and competitive encounters among human cultural conglomerates. Thus, prospective human evolution presents a dissociated horizon perspective, a mere reflection of present deep inequalities in cognitive, health, and developmental conditions and the outcome of historical experiences.

Hence, our species' *evolutionary trap* involves two possible outcomes, i.e., annihilation through war crimes or social crimes involving oppression, poverty, cultural devastation and replacement, collective stall of cognitive development, and social awareness. This would essentially depend on how cultural imprints manage the ancient animal drives of dominance, resistance, and survival, linked to our natural history. Under the enclosure of modern cultural framing, they are summarised in modern times by inequalities that affect future developments and power-seeking for profit or comparative power gains (dominance/survival) based on material, territorial, or cognitive domains.

*

Throughout millennia, human civilisation has gone through different sociocultural structures in its various geographic locations. According to Nowak (2010), there is a need to consider possible parallel scenarios of animal eusocial evolution as they may relate to the evolution of human social behaviour.

One common reference involves equality among hunter-gatherers, a theme on which Mulder et al. (2009) state that small-scale human societies range from foraging bands with a strong egalitarian ethos to more economically stratified agrarian and pastoral societies. Additionally, Smith et al. (2010) state that,

> (*Among hunter-gatherers*) wealth inequality (measured with Gini coefficients) is moderate for most wealth types, matching what qualitative ethnographic research has generally indicated (if not the stereotype of hunter-gatherers as extreme egalitarians)… The combined picture from the intergenerational transmission (β) and inequality (Gini) estimates suggests we may need to rethink the conventional portrayal of foragers as highly egalitarian and unconcerned with wealth. Even classic examples of hunter-gatherer society display more inequality than is widely appreciated.
>
> *(Italics in brackets from JAC)*

Besides hunter-gatherers, a common feature of evolving social structures has been the systematic presence of commoners, or providers of services and goods, and social marginals, their lives subjected to rules and cultural conditioning as determined by the prevailing power or social elites. Since historical times, they have been enforced either by military, financial, and mass media cultural means or by manipulating beliefs and creeds.

The latter poses the need to consider their inclusiveness in the domain of *the evolutionary trap* since they dwell on basic emotions, a powerful means to mould behavioural expressions. Within this context fall concept-related to repression and sublimation, the latter implying the transformation of socially unacceptable impulses into socially acceptable actions or behaviours, eventually resulting in a long-term conversion of the initial impulse. Both derive from strong feelings of fear of material or virtual (imaginary) menaces or the belief in a superior life. Whether they succeed in a permanent change in neural circuits feeding basic drive behaviours represents a formidable question. On historical grounds, believers in different faiths have repeatedly shown the possibility of sliding onto manslaughter battles or cruel and horrifying practices of fanatism leading to torture and death, as well as exposure to self-destruction (martyrdom). Should this be the case, it would mean that there has not been a change in basic drives, but rather a plastic – culturally bound – change in their expression or on the threshold to release those drives, either towards third persons or oneself.

Finally, it should also be considered that our species could provide shelter to two behaviourally different phenotypes, either prone to aggression or prone to peace. It reminds us of the differences in predominating comparative behavioural profile trends between chimpanzees (*Pan troglodytes*) and bonobos (*Pan paniscus*), our surviving evolutive closer primates that evolved from an ancient common ancestor to *Homo*.

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Eusociality

Although ongoing discussion on the extension of the concept of eusociality and its spread to the concept of *caste* in other animal orders, Hardisty and Cassill (2009) consider the definition to be expanded to include vertebrate social families consisting of one or more reproductive females, their offspring, and other non-reproductive helpers such as unmated aunts/uncles, grandparents, and nannies that help rear the reproductive female's offspring.

Sherman et al. (1995) considered that cooperative breeding and eusociality are not discrete phenomena but rather form a continuum of fundamentally similar social systems whose main differences lie in the distribution of lifetime reproductive success among group members.

According to Hermann (2017), eusociality is defined as a relationship between members of a group of organisms in which there are three outstanding components: (1) cooperative care of the young, (2) reproductive division of labour, and (3) overlap of generations.

Interestingly, on evolutionary grounds, comparative examples unavoidably surge in considering these structural social conditions, as if they would represent ancient bridges of universals of social structures across distant species. Two components appear as constant motivators: survival (whether on physical terms or relative social standings) and dominance. Regarding the latter, across species of the natural kingdom, the concept of dominance (Colombo 2022) or gain represents a persistent behavioural goal expressed in both collective and individual domains.

Among social structural conditions, eusociality represents an extreme form of social construction based on the dominance that assigns fixed roles to its members, as mentioned by Warner et al. (2019). This involved the existence of castes based on socially regulated nutritional access. According to the authors, results emphasise that the recruitment of both highly conserved and lineage-specific genes underlie the convergent evolution of novel traits such as eusociality.

Eusocial species provide multiple examples of genetic and environmental interactions in the construction of social caste systems in which social structure is always characterised by hierarchical stratification. According to Ratnieks and Helantera (2009), eusociality represents a social system that involves coercion and leads to inequality, thus conceptually placing it close to known socio-political systems and populations in marginal conditions in human civilisation. Their interesting view approximates several social conditions that would resemble those found in human societies. Based on insect studies, they conclude that coercion has evolved after eusociality and acts to prevent individuals from attempting to reproduce instead of working. Without coercion, a large proportion of colony resources and individual lives are directed into intra-colony competition over reproduction rather than into working.

The ancient concept of *caste* and division of labour was reformulated in modern societies in social relationships and social mobility, such as formal and virtual

inequality expressed as social *class*, social *prejudice,* and social *stratification involving poverty* and *marginalisation*.

Regarding evolutive representations in higher-order species, behaviours highly driven by genetic signals but conditioned by environmental (social and physical) factors draw interesting behavioural outcome parallelisms with social organisation in lower-order species. The general outcome consists of the formal or *de facto* establishment of hierarchies that condition access to power or leadership, reproductive rights, cognitive development, feeding and health conditions, and basic living conditions. It is proposed that the sequence of social expressions of power or dominance could be envisioned – depending on the species' interactive behavioural complexity – as represented by physical dominance, alliances, castes, classes, values, and prejudices. This assertion takes into consideration the variable components and profiles that are expressed as cultural formats. In this context, the concept of culture is limited to species-specific codes, fixed behavioural components or traditions, and instruments that conform to a community, enclosed as implicit or manifest forms of dominance (or imperative), resistance (or arguing, or competition), submission (or acceptance or cooperation), learning, and inheritance.

*

Neurobiology and Brain-Behavioural Development

Not everything is recent in our sophisticated brain, nor does the cerebral cortex act independently. Beneath it and interactive are circuits that constitute the substrate of actions of a basic, ancient menu (approach, flight, rejection, alertness, visceral regulation) of animal behaviour. They modulate and interact with neocortical circuits to configure a final behavioural expression. Earlier, this implicit notion of evolutionary "strata" led MacLean (1955) to schematically describe the primate brain as "tripartite," a concept already considered by Cristofredo Jakob (1941), proposing the interactive coexistence of circuits or elements that represented the ancient reptilian brain, i.e., of ancient mammalian cortical formations and from the recent (on evolutionary terms) cerebral cortex. Though modern concepts have reformulated this interactive, integrated coexistence of phylogenetically evolved neuronal circuitry, such proposals highlight the human brain's complex, evolutive sequential construction. Those same levels would be modified by interweaving neural differences and efferences typical of the species of new neurotransmitters and receptors and their different synaptic and topographic distribution. In other words, the circuits of our most recent cerebral cortex would co-participate and intertwine with old circuits linked to the regulation of basic requirements for survival. Behavioural characteristics will largely depend on the configuration in the interaction of cortical and extracortical circuits as a function of genetic and environmental imprinting and conditioning, though basic drives recognise a long-term brain-behavioural evolution with common a basic menu of final actions (approach/flight, cooperation/aggression, etc.).

Hierarchical social organisation impacts brain and behavioural, developmental cues, and social integration. According to Alward et al. (2020), social rank along a hierarchy is ubiquitous in social species and determines physiological state and behavioural performance.

According to Goodson (2005), the social behaviour network is a fundamental and evolutionary conserved feature of the vertebrate brain, as earlier described for mammals by Newman (1999). The *social factor* on the evolutive impact on cerebral cortex growth would not only depend on population size but also on the complexity of its social structure (Dunbar and Schultz 2007a). As proposed by these authors, the *social brain hypothesis* (with particular emphasis on the relative size of the neocortex concerning the total brain) represents an ecological hypothesis, according to which one or more ecological problems (survival, access to nutrients, raising of offspring) are better solved in a social context than individually.

In non-mammalian social species, including insects, a change in status triggers neural remodelling. Brain remodelling in mammals affects subthalamic nuclei, the amygdala, and related cortical neural circuits (see below). This impact of social status on the brain represents a significant antecedent for further considerations on the impact of sociality on brain/mental development in higher-order mammalian species.

Hierarchical access to feeding and housing represents privileges also expressed in higher-order mammals and cultured-modified privileges among human societies. Kverková et al. (2018) discuss possible factors linking social complexity and brain size in species with monopolised reproduction: social bonding, cooperation, and Machiavellian behaviour. Regarding the comparative reduced brain size in *Homo sapiens* supposedly due to cultural habits, Villmoare and Grabowski (2022) state that human brain size has been remarkably stable over the last 300 ka.

A series of evolutive vectors and their developmental impact is also expressed in higher-order vertebrates, though under complex cultural structures such as in human societies. As discussed previously, among them is the concept of hierarchical dominance strategies in social structures, the impact of social position on access to nutrients, reproductive rights, and labour classes, and their correlative impact on brain organisation and development.

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As mentioned in Colombo (2019, 2021a, b), our species' biocultural origin has its roots in ancestral habits, behaviours, and survival drive, through changing environmental conditions, and crystallised during millennia in basic neurobehavioural circuits, be it as predators or potential prey: we were not born in a mother-of-pearl cradle and protected by magic agents. Placed on the thread of time, modern cultural contexts – norms, priorities, values – appear as "newly born." This biocultural interaction and "dystopia" carved our identity, genetic expression, and the possible origin of beliefs, resulting in an arch of possible behaviours

and cultural phenotypes. Postindustrial societies became increasingly dependent on material consumerism and technological cultures to the point of "embraining" them, conceptually becoming technological hybrids. Does it represent a developmental "must" or an uncontrolled "spin-off" of human inventiveness affecting our future? It should be made present that the construction of supernatural agents played a significant role in socialisation/domestication processes. This imaginary universe, reinforced by ritual behaviours, contributed to controlling personal/collective distress of various possible origins and conditioned our "degrees of emotional and cognitive freedom."

The above-mentioned evolutive and developmental conditions driven by ancestral survival and dominance drives impinge upon the hierarchical organisation and the construction of individual profiles in organisationally and culturally complex societies, such as humans. Regarding socialisation among social animals, Atzil et al. (2018) consider that social dependency for survival may provide the ultimate driving force for socially crafted brain development and learning. A concept reinforced by Alward et al. (2020) in the sense that social hierarchies are ubiquitous in social species and profoundly influence physiology and behaviour.

In this context, brain neurogenesis and neural circuit (ensembles) formation undergo developmental stages that depend on the socioecological conditions of the species' habitat and brain regions. During this species-specific period, it traverses through stages of susceptibility to environmental factors, whether social or physical, in nature. Both epigenetic domains (Colombo 2019) impact brain configuration, performance, and behavioural profiles, as described in insects and mammalian species, as mentioned earlier (Chapter 1). In such regard, there is consistent support for the concept that environmental conditions (social, physical, and emotional) affect the brain and mental development (Hackman and Farah 2009; Hackman et al. 2010; Lieberwirth and Wang 2012; Beery and Kaufer 2015; Fang and Yuste 2017; Beery et al. 2020), involving neurocognitive systems, neural development, neurogenesis, and stress resilience and sensitivity. In this regard, it seems opportune to avoid the hierarchical concept of *corticocentrism,* a bias that skips the concept that "higher" functions of the brain are made possible by a reciprocal interconnection between cortical and subcortical structures rather than being localised only in the cerebral cortex, as put forward by Parvizi (2009). A concept also involves various brain structural levels in the reward outcome, as mentioned by Platt (2002), central to behavioural drives.

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The Construction of *the Evolutionary Trap*

A certain degree of individual submissiveness is empowered by social structure and inequalities. The quest for survival – whether physical or social – pivots on confronting two primary behavioural domains: dominance and profit (advantage).

The thrive to survive is expressed during evolution at all animal levels, including our complex human cultural history, often acquiring a belligerent profile. Comparative evolutive studies indicate that such ancestral behaviour is not germane to our basic, bipolar (in a behavioural evolutive sense) animal nature (Colombo 2019), often disguised by cultural codes. These include partisan allegiance; hierarchical structures; emotional imposition through fantastic beliefs; political, financial, and armed prevalence; corporate commercial privileges; and manipulation of consumer needs in market production demands.

Occasionally, submissiveness may prove to be a successful inter- and intragroup strategy for survival until standing up to prevail or manifest active resistance. This becomes obvious with the economic and military struggles and social unrest in the history of civilisation.

Dominant structures have progressively become an ideological construction, whether the dominant power is based on social class hierarchical traditions, financial or military, but always becoming a form of ideological/belief prevalence or imposition. The bottom line seems to be that most of them are updated expressions of the ancestral, evolutionary thrive for survival, or privileged form of living (unequal rights). In this regard, humans have become experts at manipulating emotions and information to achieve the desired goal.

Thus, the fundamental question seems to be whether we can rid ourselves of ancient drives of authoritarian-based dominance/prevalence and approach equanimous-prone communities without affecting initiatives for social or personal creativeness and improving living conditions. These must consider or compensate for individual differences in values, merits, aptitudes, and proactive behaviours and avoid generating factual (irrational) dominance instead of dialectic processes and consensus-based decisions. Additionally, fostering *creativeness* has long been awaiting viable proposals, as utopic as they might be considered in our days. The balkanised – superficially globalised – condition of our human societies in socio-cultural developments and compromise of thriving toward equal rights (health, education, free expression) suggests a fractured horizon.

Historically, human civilisation has shown that the main socially interactive vectors have been those of dominance, prevalence, and the elimination of subdued cultural expressions, as it has been grossly expressed in historical conquest or domination campaigns.

In modern times, technological developmental drives tend to dominate the human cultural scenario, with collective and individual consequences. Principal power sources (whether based on religious, corporate, ideological, or military power strategies) would tend to place the human species under an unstoppable "cultural processing machine" aimed at generating a "processed cultural soup" with the risk of minimising whatever self-identity and brain/mind (rational and emotional) individual resources remain. Reducing people's awareness, access to meaningful information, and thriving on reacting or actively resisting can be foreseen following trending cultural banalisation, information access control, poverty, and marginality, or maximising emotional dependence by manipulating public media contents.

Should potential financial profit remain the primary corporate objective, its interests will remain in exchanging bare minimum improvement on public living conditions for logarithmic-based increased profit and market dominance power. These manifest uneven objectives represent perhaps the primary core conditioning factor of our overcoming future as *equal rights* and *opportunity-driven* global society and the survival of multicultural social constructs. This Gordian knot is pivotal for constructing a horizon of universal growth and progress (cognitive, public health, education, and labour access).

According to reports from different sources (United Nations Program for Development, UNDP, The World Revolution, World Health Organization), between 2004 and 2006, 3 billion people lived on less than 2 dollars per day, and 1.3 billion with less than a dollar per day (extreme poverty). Also, 2.4 billion people lacked proper housing, 1.1 billion lacked drinking water, nearly 900 million adults were registered as illiterate, and 300 million children never attended or completed primary school. The wealthiest 5% of the global population had higher incomes than the poorest 80%. Also, the combined income of the 300 most affluent families equals the annual income of 45% of the world's population.[2]

The rate of improvement along these social variables does not keep a similar pace with cognitive complexities in the modern world and the required adjustments in individual and collective domains.

Any move towards improving living conditions across social strata is rapidly offset by the unpredictability of an unstable world condition – wars, famine, massive migration, world economic drawbacks, political misdoings, corruption, stagnation of educational programmes, and intervening natural disasters.

On world health grounds, despite focal improvement in some regions, the World Health Organization (WHO) 2021 report states that, despite recent global health gains, people everywhere continue to face a complex blend of interconnected threats to their health and well-being. In addition, only half of the countries include disaggregated data in national health statistical reports. Many of these threats are rooted in social, political, economic, and gender inequalities and other determinants of health.[3]

Among social inequalities is the level of awareness of technological developments and high-tech advances that impact the future of the public. For example, corporate and advanced technology projects tend to surpass rational public awareness with long-term consequences. They carry doubt regarding the profit goal that drives them – expansion of their financial and political power staging – for which they condition public opinion and consumer expectations.

It should be made clear that reformulating technological developmental goals should not imply erasing or interfering with technological improvements if they are focused on the current needs of community development and anticipated benefits. Unfortunately, there are examples of the latent threat of using outer space technology for developing power-dominance strategies.[4]

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Our brain's plasticity and mind construction (depending on socio-cultural issues and contexts) provide strategies for adaptative responses. However, so far, these have not cancelled the framework of primary drives imprinted in the heart of our animal construction but instead affected their expression of socio-cultural profiles. The multiple worldwide cultural systems express how they reformulated, sublimated, and camouflaged those primary drives. That is, bio-social interaction continues to model social, behavioural trends, or social phenotype landscapes on top of the basic, deeply entrenched survival and prevalent drives conformed according to the basic structure of the ancestral animal nature. This, plus power corruption behaviour, has conditioned the disparate current social, cultural, and cognitive conditions among nations, ethnicities, and individuals that have contributed to building the fractured composition of our modern world. This is in addition to the unequal distribution of economic resources; military, political and financial dominance; unequal rights; poverty; disparate financial wealth; and relative access to cognitive development and quality of life. Blatant inequity, torture, warfare conditions, and aggressive behaviour express an ancient, basic, behavioural dominance drive. It conditions our thoughts and actions under the superficial profile decoy of a cultured *Homo*, imprinted through evolutionary times in our basic behavioural mechanisms.

Thus, unleashed ancient drives towards dominance and profit (gain) fuel prevalent social behaviour. Technological advances trickle down unequally to social development and manage to control, or acquiesce, the satisfaction of the masses by providing controlled access to such developments. Additionally, oligopolist corporations influence or modulate political power and socio-cultural profile development, a form of sharing dominance over public freedom and developmental needs. Under these conditions, our species will be tied-up to *the evolutionary trap* constantly fuelled by ancient dominance drives cramped into our basic behaviours, despite any cultural make-up or Machiavellian disguise.

As stated previously (Colombo 2019), we can provide evidence of our species' creative talents in the arts, letters, science, and technology, place at risk our survival when seeking aid for an unrelated person, build the most astounding architecture, or show emotion at the song of the *bird from paradise* or the mockingbird. However, we can also disclose cruel behaviours that depart from those observed as part of the quest for survival in the natural kingdom, condemn to slavery individuals or communities, or ignorance and indigence, and do it for our sake and privilege or profit, or fundamentalist beliefs.

One aspect of *the evolutionary trap* involves manipulation or control of mass consumerist priorities – the promotion of cultural banalisation that promotes a collective sense of species self-esteem. The latter is based on scientific progress in various domains of earthbound and space-bound exploratory projects fuelled by corporate profit goals and by political power tug-of-war. In the meantime – below such cover of technological progress – ecological degradation, commercial overexploitation of sea- and land-bound species, and degradation of living and educational standards of massive world populations raise severe concerns on the well-being of our collective human society on ground Earth.

Non-primate omnivorous animals' survival depends on a limited number of variables related to the ecosystem, the nature of the prey, the health of the ecosystem, and individual abilities to adapt and act based on experience. Variables depending on the actors (predator and prey) conform to an equation of fixed terms. This is not the case with humans, whose behaviours are potentiated by continuously developing cognitive strategies and technological means. Precisely, the enriched cognitive capabilities conform to the main survival and relational difference with the rest of the animal kingdom and *simultaneously* contribute to perfecting *the evolutionary trap*. The horizon of possible undertakings also involves the basic support of species survival, i.e., its equilibrium with the ecological system, an important event not menaced by non-human animals that survive in unstable equilibrium with the ecosystem. We, humans, are systematic violators of such equilibrium at the cost of compromising land, sea, and climate qualities and species survival. In summary, on ecological grounds, human cognitive development provides a two-sided path: rational users and abusers.

The following components of our species' survival equation on Earth compound *the evolutionary trap*:

- Behavioural dependence on ancient, basic neural circuits that condition survival strategies
- Social construction of differential wealth, political power, and social staging
- Accelerated scientific-technological development beyond our collective capacity to control it and contain or predict its social and ecological impact
- Deviant expression of basic drive domains (pathological social behaviours in leaders and commoners)
- Severe ecological degradation and climate disruption; constant competence for the development of instrumental means for war and dominance; worldwide wealth; and health and educational inequalities with poverty rates impinging on individual cognitive and social domains; the sum of which place under siege all the positive, constructive, and creative actual or potential profiles of our species
- Undue expression of dominance and violence triggering social unrest or revolutionary events, and pathological social behaviours
- Financial and corporate interests that continue providing the bare minimum of public living conditions improvements in exchange for increasing profit as the main objective
- Beliefs and creeds that promote fanatic, aggressive standings

Escape from *the evolutionary trap* would imply becoming smart enough to overcome greediness and dominance drives in their multiple forms, changing our sets of values and irrational alliances, and resetting our interaction with ancient animal drives; most of these seem regrettably utopic but urgently needed actions.

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Notes

1 https://abovethelaw.com/2018/05/goldman-sachs-asks-is-curing-patients-a-sustainable-business-model/#:~:text=Goldman%20Sachs%20basically%20concluded%20that,compared%20to%20ongoing%2C%20chronic%20treatments.
2 United Nations Program for Development, UNDP, 2006; WorldWatch Institute (2004); World Health Organization (2004). The World health Report: 2004, Changing history; World Health Organization. https://apps.who.int/iris/handle/10665/42891.
3 https://www.who.int/data/stories/world-health-statistics-2021-a-visual-summary.
4 https://www.aa.com.tr/en/analysis/analysis-space-the-new-address-of-global-competition/2425107.

8

THE STATE OF THE WORLD

As mentioned in Colombo (2020a, b), the plasticity of our brain and mind construction (depending on cultural issues) provides room for adaptative responses. However, they do not cancel the framework of primary drives imprinted in the heart of our animal construction, although they may affect their expression. Psychological mechanisms disguise or temper some of the behavioural consequences of such friction or uncoupling. Our species' knowledge, creativity, and technological developments gave support to a dominant macro species that, at the same time, attempts to avoid taking full conscience of its animal origin and fundamental biological nature – a condition that affects our emotional expressions and social drives (territorialism, reproductive and feeding priorities, survival, prevalence). The belligerence, cruelties, social inequities, and unrelenting individual and class ambitions are the best testimony that to change our ancestral drives, we must first recognise them and assume our fundamental nature heritage. Profound cultural changes are only possible and enduring if we come to grips with our true primary condition.

Convergence of basic behavioural drives – such as survival, dominance/prevalence, and kin cooperation – takes place on a broad spectrum of invertebrate and vertebrate species. It includes the concept of hierarchical dominance strategies in social structures, the impact of social position on access to nutrients, reproductive rights, and labour classes, and their correlative impact on brain organisation and development. These evolutive vectors appear moulded by group member interactions. In higher-order vertebrates, as it does in human societies, they are represented by dealings among complex socio-cultural profiles.

Interactions within and between biological, cultural, and environmental domains generate an undefinable perspective for its continuous evolution, perhaps reproducing ancient evolutive options that define changing odds for survival or extinction. In natural history, these options have been present since

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primaeval times. Numerous species thrive, but so many others, or more, underwent extinction. Do the special capabilities of our human species provide safe insurance against extinction?

The above alternatives are complicated by ancestral, embrained drives embedded in our natural history from which we derive, such as dominance, territoriality, and survival. The latter provide grounds for the periodical emergence within our species of warmongers with expansionist/dominance projects within earthbound or space-bound contexts. Technological developments in the hands of corporate and dominant political leaderships represent faithful copies of *Dr Jekyll and Mr Hyde* and do not reassure that those decisions will be taken based on solidarity or placing common welfare interests as a priority. Observing the distribution of global budget priorities and action, background, and corporate profiles of prevailing leaders feeds serious doubt about the outcome and the need to reframe our values and priorities.

As Whiten and Erdal (2012) have proposed, the evolution of a new *socio-cognitive niche* that allowed hunter-gatherer bands to function for some time as a unique and highly competitive predatory organism provided a strategy to prevail in highly competitive conditions of natural history. Through time, with the advent of settling as farmers and property owners, some of these organised bands evolved into various institutionalised social forms. Modern times show that they embody drives we have not been able to overcome nor contribute to escape our species' *evolutionary trap.*

As Bateson (1972) affirms, survival depends on interactive components that form a dynamic unit, i.e., organism plus environment. As the author underlines, the organism which destroys its environment destroys itself. Humans have managed to proceed systematically, allowing some adaptation to take place, which has slowly paved the road to critical ecological and environmental conditions. This was also approached by Kitzes et al. (2007),

> Despite ample recognition of the importance of achieving sustainable development, exemplified by the Rio Declaration of 1992 and the United Nations Millennium Development Goals, the global economy fails to meet the most fundamental minimum condition for sustainability – that human demand for ecosystem goods and services remain within the biosphere´s total capacity.

Perhaps the following statement from *The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)* (2019) would help to synthesise the risk involved with current world trends,

> The negative trends in biodiversity and ecosystem functions are projected to continue or worsen in many future scenarios in response to indirect drivers such as rapid human population growth, unsustainable production and consumption and associated technological development…. Except in scenarios that include transformative change, negative trends in nature, in ecosystem functions and in many of nature's contributions to people are projected to

continue to 2050 and beyond, due to the projected impacts of increasing land-/and sea-use change, exploitation of organisms and climate change.

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On Corporate Political Involvement (Post-Democracy?)

The following comments define a somewhat generalised sociopolitical condition based on common political and financial practices. According to Ashforth and Anand (2003), rationalisations and socialisation practices allow perpetrators of unethical activities to believe that they are moral and ethical individuals, thereby allowing them to continue engaging in these practices without feeling pangs of conscience. Alzola (2012) considers that by taking advantage of this unfair regulatory framework, business firms are undermining the basis of a robust democratic regime at both the societal and the corporate levels. Nyberg (2021) stresses that corporate involvement in democratic processes typically takes the form of corporate political activity, thus exerting a corroding influence on democratic processes, to the point that the term "post-democracy" is applied to describe how businesses exercise inordinate political power to shape governmental policy.

*

There is no correlation between the developmental threats to individual and collective progress people face and the investment spent on tackling them. The world spends billions of dollars, yen, yuan, rubles, and francs on finding life on other planets, and an unimaginable amount of dollars, yen, yuan, rubles, and francs on severely compromising natural resources and ecosystems on this planet. A few indicators of the global conditions provide an approximate estimate of the inequalities it embraces. As stated in Colombo (2019), looking at the world map of the Human Development Index (UNDP) (2018) and the Living Planet Report (2018), the data distribution approaches an inverse relationship. That is, countries with higher HDI show a higher material consumption and ecological footprint than those of third-world countries.

In comparison, those with lower HDI offer the lowest material consumption and insufficient access to knowledge and comfort. Poorer and less developed countries share a world contaminated and abused by the higher developed ones. Can we consider this as evidence of a "globalised world"?

This concern is reinforced by inequality, as described in the World Inequality Report 2018. It has increased worldwide despite substantial geographical differences, with the richest 1% twice as wealthy as the poorest 50%. Furthermore, according to this report, trends from the last few years show a **generalised increase in inequalities**: from 1980 to 2016, they have grown, especially in the United States, China, India, and Russia. According to the World Investment Report (2022), inequality is not a fatality, but a political choice, further stating

that addressing the challenges of the 21st century seems hardly feasible without large redistribution of income and wealth inequalities.[1]

Physical access and critical reading of informative content are the heritage of a minority of the world's population. Without proper education, the decoupling of the integration of the communities progresses and deepens with the increased speed of acquiring new knowledge. In this context, it seems unavoidable that the socio-cultural decoupling of our civilisation would lead to far different futures in terms of cultural evolution, social insertion, and future community goals. Additionally, ancestral cultural drives and religious belief constraints add to human civilisation's kaleidoscopic future.

According to the World Bank (2019), the estimated societal poverty headcount based on the Societal Poverty Line (SPL) was approximately 2.1 billion people in 2015. This count is almost three times more than the global count of people living on less than $1.90 per day (estimated at approximately 731 million in 2015).[2]

While cultural variety could provide an enrichment of options to our human species' development, it could drag incompatible behaviours and increase social entropy when it involves social inequalities based on wealth-based elitist or demagogic regimes. As lucidly stated by Manstead (2018), material circumstances in which people develop and live profoundly influence how they construct their lives and social environments. This assertion impacts present and future social interactions, including access to educational and employment opportunities that would impact social mobility and access to material goods and their self-evaluation and construction of their future lives. According to Manstead (2018), given that social class differences have origins in economic inequality and access to education, redistributive policies are urgently needed to create greater equality.

> From a historical perspective, it appears that global inequalities are about as large today as at the peak of Western Imperialism in the early 20th century.[3]

According to the World Inequality Report (2022) data,[4] it anticipates a continued wealth/income gap inequality and hence profoundly unequal future opportunities and a potential source of social distress. This report affirms that the wealthiest 10% of the global population currently takes 52% of global income, whereas the poorest half earns 8.5%. Additionally, global wealth inequalities are even more pronounced than income inequalities: the poorest half of the global population possess 2% of the total, while the richest 10% own 76% of all wealth. This figure resumes the false concept that pretends to define our world society as *globalised;* this is not direct access to communication exchange since information awareness implies a wide range of cultural interest domains. What truly globalises the world population is the dimension of wealth sharing, access to cognitive development, and humane living conditions.

*

Planetary Boundaries

As stated by Rockström et al. (2009), planetary boundaries define the boundaries of the "planetary playing field" for humanity should we attempt to avoid major human-induced environmental change on a global scale. Rockström et al. (2009) further state that the Earth has entered the Anthropocene era, where humans constitute the dominant driver of changes to Earth's ecology, climate, and living species conditions. The author additionally considers that the exponential growth of human activities raises concern that further pressure on the Earth system could destabilise critical biophysical systems and trigger abrupt or irreversible environmental changes that would be deleterious or even catastrophic for human well-being. This condition reflects that the predominant paradigm of social and economic development remains mainly oblivious to the risk of human-induced environmental disasters.

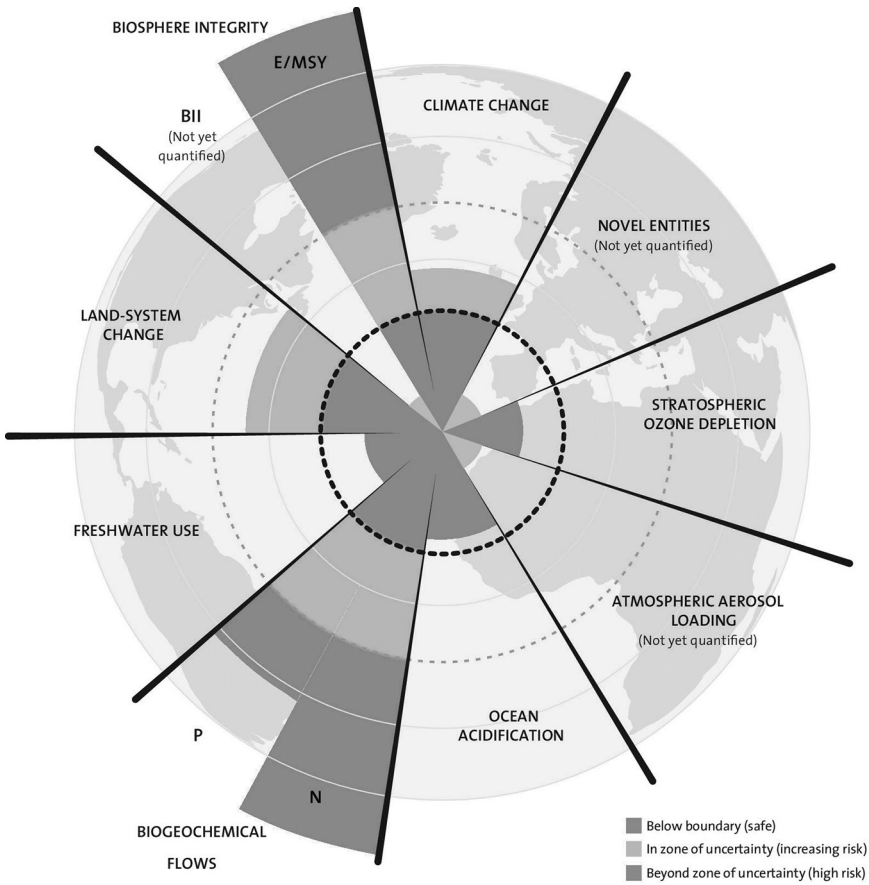

FIGURE 16 The planetary boundaries framework. Licensed under CC BY 4.0. Credit: J. Lokrantz/Azote based on Steffen et al. (2015).

As reported by the *Stockholm Resilience Centre,* following the initiative of a group of internationally renowned scientists, it attempted to identify the nine processes that regulate the stability and resilience of the Earth system. They proposed quantitative planetary boundaries that, if crossed, would increase the risk of generating large-scale abrupt or irreversible environmental changes. As Wang-Erlandsson et al. (2022) mentioned, the planetary boundaries framework challenged global paradigms on economic growth, national legal sovereignty, and anthropocentrism.

The state of these boundaries as of 2015 and the following years are represented in Figures 16–18.

According to Figure 16 (2015), some boundaries have already been beyond the zone of uncertainty, implying high risk, and others entered the zone of uncertainty (increasing risk). Figures 17 and 18 show their progression since 2015.

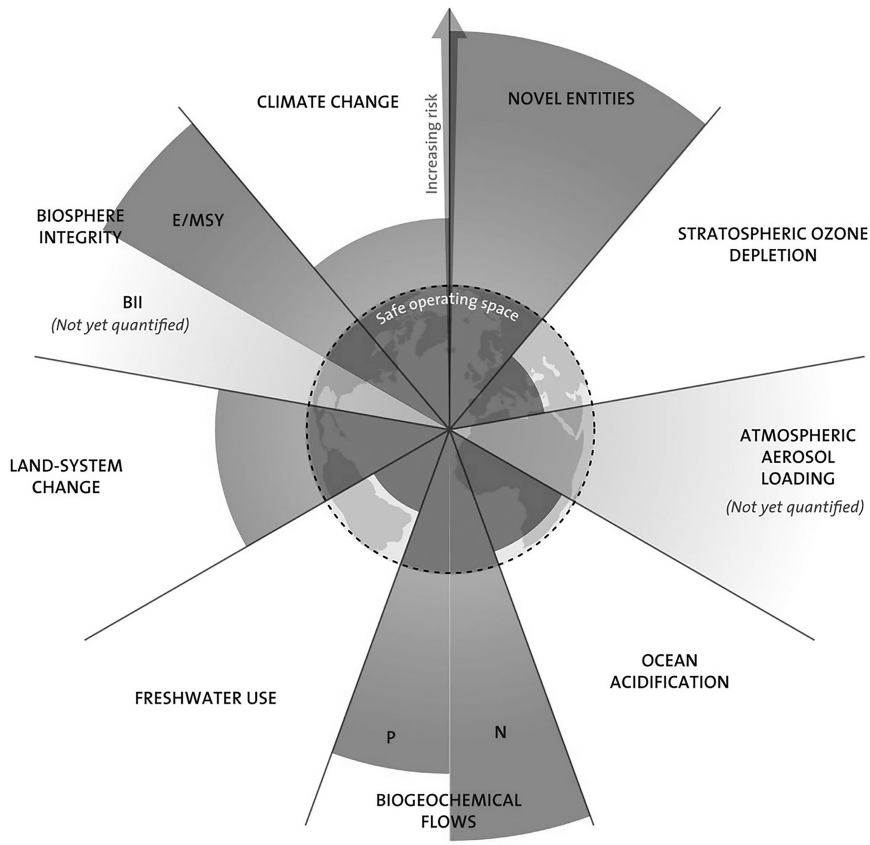

FIGURE 17 The planetary boundaries framework. Licensed under CC BY 4.0. Credit: Azote for Stockholm Resilience Centre, based on analysis in Persson et al. (2022) and Steffen et al. (2015).

According to available information updates (2022), this chart (Figure 17) shows additional boundaries beyond the zone of uncertainty related to environmental pollutants and other "novel entities," including plastics.

In this regard (novel entities), the report states (Persson et al. 2022) that increasing trends of production and emissions of diverse novel entities that outstrip our efforts at safety assessment and monitoring is a transgression of the planetary boundary.

According to the same source, an April 2022 reassessment of the planetary boundary for freshwater indicates that it has now been transgressed, as shown in Figure 18.

These boundary estimates – attaining greater risk levels in a relatively short time – relate to descriptive conditions on several worldwide domains that follow.

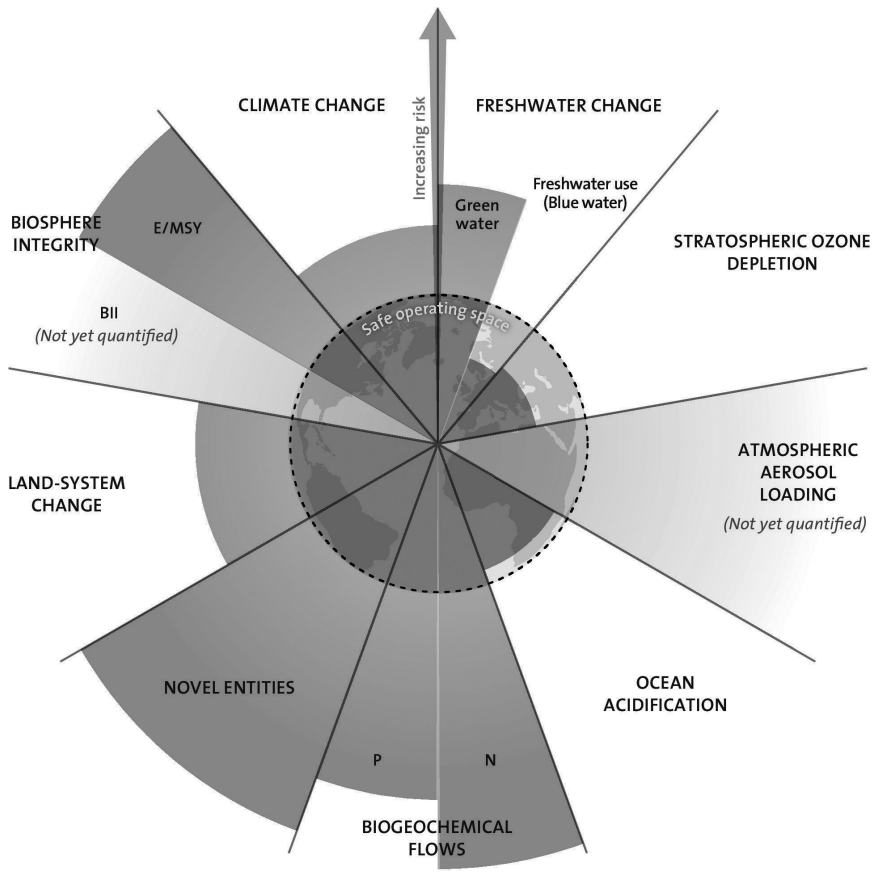

FIGURE 18 The planetary boundaries framework. Licensed under CC BY 4.0. Credit: Azote for Stockholm Resilience Centre, based on analysis in Wang-Erlandsson et al. (2022).

They stress the need for urgent, viable enforcement by international agencies and public institutions to curve current trends.

> In January 2022, 14 scientists concluded in the scientific journal Environmental Science and Technology that humanity has exceeded a planetary boundary related to environmental pollutants and other "novel entities" including plastics.[5]

*

Forest Resources and Environmental Degradation

As Bateson (1972) stated, the organism which destroys its environment destroys itself. In this domain, Searchinger et al. (2022) state that this cropland expansion rate would reduce forests and savannas by an area the size of India.

According to the Global *Forest Resources Assessment* (FAO 2020), half of the forests that originally covered 46% of the Earth's surface have disappeared, and 10%–20% of all species will become extinct within 20–50 years. The surface of forest resources has lost 178 million Ha since 1990 – though at a lower rate – equivalent to Libya's surface. Between 2010 and 2020, Africa had the most significant loss (3.9 million Ha), followed by South America (2.6 million Ha).

Forest areas without visible signs of human presence – primary forests – represent 36% of the total, affecting deforestation or selective logging at 6 million hectares per year. The impact on biodiversity due to these human actions is enhanced by introducing exotic species (plants and animals). According to Vaughan (2022),[6] the Amazon rainforest is nearing a tipping point that will see it transform into a savannah, according to researchers who have found that the biodiversity hotspot has lost resilience in the past two decades. Furthermore, according to an article in The New Scientist, destruction of the world's remaining intact forests continued in 2021 at a rate barely changed in recent years, despite more than 100 countries at the COP26 climate summit pledging to end deforestation this decade. Around 3.75 million hectares of tree cover disappeared across intact or "primary" humid tropical forests in 2021, new satellite data from Global Forest Watch show. Global Forest Watch, an initiative of the World Resources Institute with partners including the University of Maryland, estimates that this tropical forest loss released 2.5 billion tonnes of carbon emissions – on a par with India's annual emissions.[7]

The high degree of deforestation trends, in this case, in the Amazon, one of the world's largest tropical forests, has been reported in the public media. By the mid-20th century, the Amazon, which generates around 10% of the planet's oxygen, had lost 17% of its tree cover

According to a recent report, indigenous leaders from the nine countries and territories that encompass the Amazon region, organised as the Amazon Geo-Referenced Socio-Environmental Information Network (RAISG), reported that so much of the rainforest had been lost that it has reached a crucial

tipping point, that would turn forest to savannah earlier than expected. The tipping point threshold would represent about 20%–25% of combined loss and degradation. The latest report states that about 20% of Amazon has been cleared and another 6% will become highly degraded in 35 years. The unequal climate impact of human activities could be summarised by the statement of Devi (2022), according to which, although Africa has contributed little to the changing climate, accounting for just 2%–3% of global emissions, climate change is a crucial factor driving drought and food shortages.

The additional report by the World Food Programme indicates that up to 90 million people in East Africa are currently food insecure and that acute malnutrition is rising steadily (Devi 2022). Thus, world inequalities go beyond wealth distribution and cognitive enhancement opportunities (see below) to affect the basic survival conditions and reinforce the developmental gap among countries and communities imposed by corporate interests and unsound political measures beyond cultural profiles.

*

Access to Drinking Water

Worldwide inequalities are crudely expressed in reports dealing with basic needs such as access to fresh water, hygiene, and sanitation. The following statement describes the unacceptable condition on this matter,

> Because freshwater resources are unequally distributed across the globe, many human populations do not have access to clean, safe drinking water. According to the United Nations, 2.1 billion people around the globe lacked access to safely managed drinking water in 2017…Lack of access to clean drinking water leads to more than 3 million deaths every year.

According to the key findings of the report by the WHO/UNICEF Joint Monitoring Programme (JMP), conditions for Water Supply, Sanitation and Hygiene (WASH) (2022) were as follows:

***Hygiene*:** Half of healthcare facilities (51%) worldwide lack basic hygiene services with water and soap or alcohol-based hand rub where patients receive care and at toilets in 2021. Around 3.85 billion people rely on these facilities, including 688 million who receive care at facilities with no hygiene services.

***Water*:** Four in five healthcare facilities (78%) globally had basic water services, meaning water was available from an improved source on the premises in 2021. However, 1.7 billion people lacked basic water services at their healthcare facilities, including 857 million people globally who had no water service at their healthcare facilities.

***Sanitation, environmental cleaning, and waste management*:** There were not enough countries with national data to calculate regional and global coverage

of basic sanitation, environmental cleaning, and waste management services. However, 41 countries representing 19% of the global population had sufficient data to estimate national coverage of basic sanitation services in healthcare facilities. National data on basic environmental cleaning services were available only in 21 countries, representing 7% of the global population, while national data on basic waste management services were available for 65 countries representing 24% of the global population.

*

Poverty Rates as an Epidemiological Event

As defined by the Report of the Commission on Global Poverty (2017), poverty is a multidimensional concept that reflects multiple deprivations in various aspects of well-being.

The last report (2022) from the World Bank's International Bank for Reconstruction and Development on Poverty and Shared Prosperity states that 46% of the worldwide population, 3.4 billion, struggle to meet basic needs. The percentage of people living on less than US$ 1.90 a day dropped from 11% in 2013 to 10% in 2015. However, that means 736 million people worldwide were still living in what the report describes as extreme poverty. In addition, 26.2%, or 1.9 billion people, lived on less than US$ 3.20 daily.

As stated in Chapter 1, the condition of poverty tends to standardise communities and recreate a proper set of values and norms, on the one hand by forcing them to function in pursuit of basic or primary survival goals and on the other by subjecting them to a spectrum of biomedical risks and cultural hollowing out or generating its proper culture. In short, it marginalises them from enriching individual and collective processes, creating a matrix of negative conditions for developing brain and mental potential. Therefore, poverty is detrimental to the individual, to the community, and to the species, depriving it of potential sources of biological and cultural variability.

The previous and following figures and comments should be placed under the context that unaided early childhood poverty has long been associated with lower school achievement, educational attainment, and adult earnings (Colombo 2007; Lipina and Colombo 2009; Lipina et al. 2012, 2013; Farah 2017; Noble and Giebler 2020).

The World Bank (WB) continues to dwell on *extreme poverty* statistics, based at US$ 1.90 a day and makes predictions on the lowest economic stage of the world population, though following a 2022 release,

> The World Bank updated the global poverty lines in September 2022. The decision, announced in May, follows the release in 2020 of new purchasing power parities (PPPs)—the main data used to convert different currencies into a common, comparable unit and account for price differences

> across countries. The new extreme poverty line of $2.15 per person per day, which replaces the $1.90 poverty line, is based on 2017 PPPs.[8]

According to the World Bank, this means that anyone living on less than $2.15 a day is considered to be living in extreme poverty. About 648 million people globally were in this situation in 2019.

New data at cut-offs of US$ 3.20 and 5.50 (poverty also involving the lower-middle-class population) has been sporadically included in reports. Even at the lower cut-off level, the WB predicts that the current crisis will expand its impact into the future, based on combining the effects of economic, political (armed conflicts), and climate change which would be a slowly accelerating risk that could drive millions into poverty.

In 2018, the WB introduced two new cut-off levels: higher poverty lines at US$ 3.20 and US$ 5.50 per day reflect national poverty lines in lower-middle-income and upper-middle-income economies, respectively. The WB concludes the report with a sombre prediction, as it states that new analysis included in the report shows that the crisis has rapidly reduced shared prosperity and threatens to durably widen income inequalities in many settings, leading to lower social mobility in the longer term and making it harder for economies to return to inclusive growth.

These figures (take note that they are based on US$ 1.90 per day) of the WB approach could be considered a contrast to the concept of globalisation, mainly affecting sub-Saharan African countries, as revised in 2019.[9] According to the same source, in 2020, the 37 economies formally classified as affected by fragility, conflict, and violence are home to only about 10% of the world's population, but they account for more than 40% of the global poor.

The *United Nations Development Programme* and *Oxford Poverty and Human Development Initiative* informed (2020) on the Multidimensional Poverty Index (MPI), consisting of,

> … the product of the incidence of poverty (proportion of poor people) and the intensity of poverty (average deprivation score of poor people) and is therefore sensitive to changes in both components:
>
> Structure of the global Multidimensional Poverty Index
>
> Three dimensions of Poverty:
>
> Health-Education -Standard of living.
>
> Indicators:
>
> Nutrition -Child Mortality-Years of schooling -School attendance- Cooking fuel-Sanitation -Drinking water -Electricity -Housing -Assets.

The survey covered 107 countries and 5.9 billion people in developing regions. However, some African countries responded differentially in the annualised absolute change in the percentage of people who are multidimensionally poor and deprived in each indicator (percentage points); most improved by less than

3 points/year. Some of the most improved countries, such as Sierra Leone, Mauritania, and Liberia, started with a head count spread of 63–81.6 percentage points of the MPI. According to the UNDP report, the key findings include:

- Of the 1.3 billion multidimensionally poor people, 82.3% are deprived in at least five indicators simultaneously.
- 71% of the 5.9 billion covered experience at least one deprivation.

Yet, according to the 2021 Eurostat Statistics site, data on social inequality are not concentrated on particular regions or countries,

> In 2021, 95.4 million people in the EU were at risk of poverty or social exclusion; this was equivalent to 21.7% of the EU population.[10]

One year later, the Global Multidimensional Poverty Index reported by the United Nations Development Programme and Oxford Poverty and Human Development Initiative (2020) indicated that,

> Across 109 countries 1.3 billion people— 21.7 percent—live in acute multidimensional poverty.
>
> Almost 690 million (28.2 percent) of the 2.4 billion people in the 41 countries with ethnicity, race, and caste data live in multidimensional poverty.
>
> About half (644 million) are children under age 18.
>
> Nearly 85 percent live in Sub-Saharan Africa (556 million) or South Asia (532 million).
>
> 481 million live with an out-of-school child.
>
> 550 million lack at least seven of eight assets (radio, television, telephone, computer, animal cart, bicycle, motorbike, or refrigerator) and do not have a car.
>
> 568 million lack improved drinking water within a 30-minute roundtrip walk.
>
> 635 million live in households in which no member has completed at least six years of schooling.
>
> 678 million lack electricity.

According to the WHO (2021) report on multidimensional poverty (health, education, and living standards), around 3.6 billion people worldwide are affected by at least one of these three deprivations, and 435 million people are affected by all three at the same time. It should be considered that the parameter used to measure extreme poverty was US$ 1.90 per day, but poverty conditions were also considered at less than US$ 3.50 and 5.10 per day.

Based on the World vision report,[11] 1.3 billion people in 107 developing countries, which account for 22% of the world's population, live in multidimensional

poverty (*US$ 1.90 per day*). About 84.3% of multidimensionally poor live in Sub-Saharan Africa and South Asia. Additionally, 644 million children are experiencing multidimensional poverty.

Figures 19 and 20 show that the latest global data tells us that 85% of the world's population lives on less than US$ 30 per day – more than 6.5 billion people.

> Extreme poverty is defined by the UN as living on less than $1.90 a day. Why do we need a poverty line that is so extremely low? It is not enough to measure global poverty solely by a higher poverty line because a large number of people live on *very* low incomes. If we'd only rely on the poverty line from high-income countries, we would hide the very stark differences

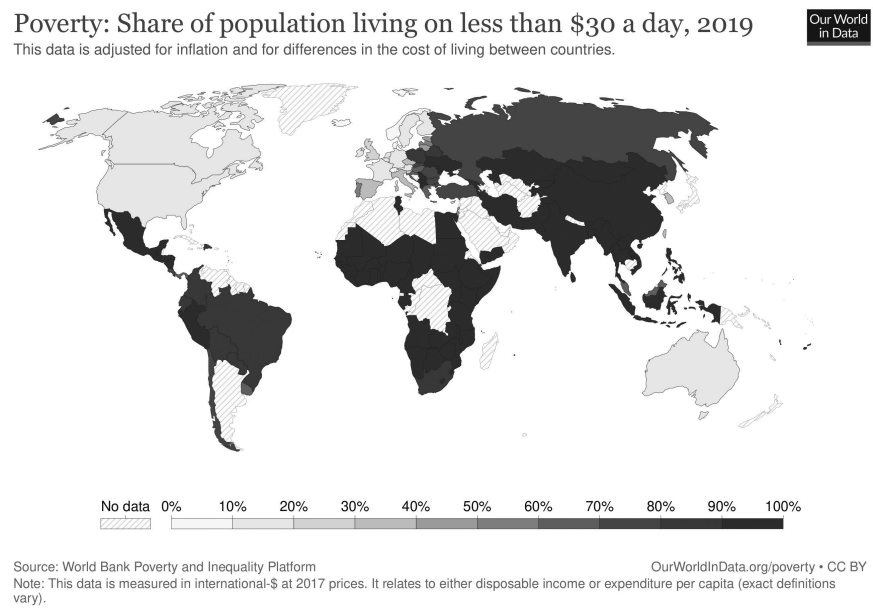

FIGURE 19 Share of the population living on less than US$ 30 per day.
Source: Our World in Data (https://ourworldindata.org/grapher/poverty-share-on-less-than-30-per-day?country=IND~DNK~KOR~ESP~POL~NOR).[12]

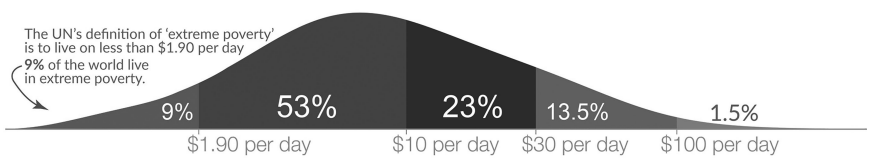

FIGURE 20 Global income distribution.
Source: Our World in Data (https://ourworldindata.org/extreme-poverty-in-brief).

> between people with very different living standards. Whether someone was living on almost $30 a day or on 30-times less would not matter – they would all be considered 'poor'.[13]

Furthermore, according to *Development Initiatives*,[14] in 2021, an estimated 698 million people, or 9% of the global population, lived in extreme poverty and on less than $1.90 a day. Over one-fifth of the global population lived below the higher $3.20 poverty line (1.803 billion) and more than two-fifths (3.293 billion) below $5.50 a day. Projections using the latest growth estimates from the International Monetary Fund (IMF) estimate that by 2026, 3 billion people will remain below the $5.50 poverty line and 1.5 billion on less than $3.20 per day.[15] As stated by the same source, *Developing Initiatives 2023* update,

> Estimates for 2022 indicate that poverty rates have likely returned to 2019 levels, with about 682 million people (8.5% of the world population) living in extreme poverty.

According to the World Bank,[16] even under reasonably optimistic scenarios developed before the COVID-19 pandemic, 6.1% of the world's population would likely still live in extreme poverty by 2030. In the mentioned report by *Developing Initiatives 2023,* it is stated that, according to the World Bank,

> In 2022, we estimate that 1.85 billion people (26% of the global population) lived below the threshold of $3.65 a day and 3.71 billion (46% of the global population) lived below the threshold of $6.85 a day.

To test the dependence of the poverty line on the choice of the dollar/day cut-off, Chen and Ravallion (2012) plotted the per cent of headcount index against the poverty line cut-off, up to a maximum poverty line of $13 per person per day. It showed a steep increase in the headcount index up to approximately a poverty line of US$ 3 and a progressive increase up to US$ 13, reaching approximately 90% of the headcount index.

As shown in Figure 21,[17] according to the Global Lorenz Curve, in 2015, the top 20% of the world's population received 70% of the global income, and the lowest 80% received 30%. This substantial inequality of income distribution represents another instance of *dominance* – one main derivative component of our *evolutionary trap* – that tends towards autocratic forms of conflict management and represents a challenge for policies aimed at equal rights and globalisation.

Hickel (2019)[18] affirms debating poverty concepts that our world is more prosperous than ever before, but virtually all of it is being captured by a small elite. Only 5% of all new income from global growth trickles down to the poorest 60% – and yet they are the people who produce most of the food and goods that the world consumes. Additionally, it is claimed that the poverty line should be set even higher than current levels, at US$ 10–US$ 15 per day.

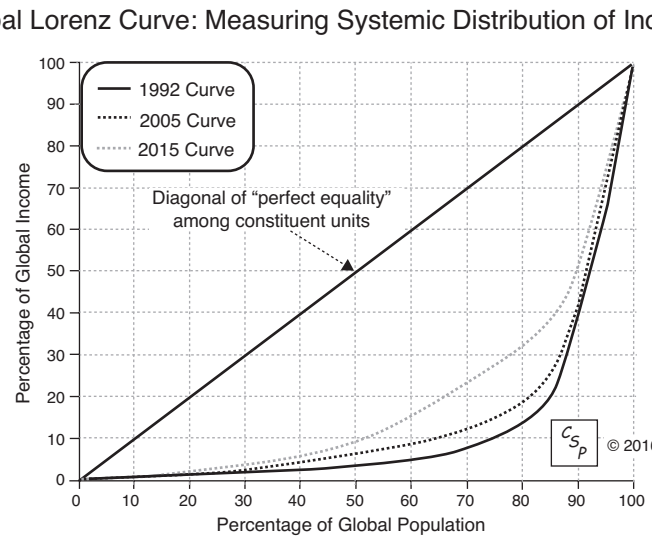

FIGURE 21 An approach to measuring the systemic income distribution by applying the Lorenz curve (http://www.systemicpeace.org/CTFigures/CTfig01.htm). The *Lorenz curve* describes income distribution in a population, i.e., the degree of income or wealth inequality in an economy. It relates the cumulative percentages of the population with the cumulative percentages of the income that this population receives. Reproduced with permission by Center for Systemic Peace (2016).

In an interesting article published by the World Bank (2012), Chen and Ravallion managed poverty figures and concluded that the trend has been towards *more relatively poor people in a less impoverished* world. First, this statement seems to overlook that cutting the poverty level to US$ 1.90 per day has been widely questioned, as shown by comparative graphs and previous brief statements. However, the following statement from those authors involves a practical reality: the problem with global poverty comparisons is that we do not know which of these two interpretations is right, i.e., differing social norms or social effects on welfare. Furthermore, we may never resolve the matter from conventional empirical evidence. This uncertainty makes it compelling to consider both approaches when measuring global poverty. It was concluded that many developing countries have moved into the region where relative –i.e., comparative on social grounds– considerations become more important, and the relative measures of poverty are naturally less responsive to economic growth and more responsive to inequality.

The more inclusive concept of multidimensional poverty expands the income per day to a series of other parameters that complete the concept of poverty (*Multidimensional Poverty*) (Alkire 2020). In this context, eliminating poverty and

promoting equal developmental opportunity is a matter of plain solidarity in a humane world. However, it involves other consequences relative to the condition of a cognitive-developmental handicap to which these individuals are exposed, given that chronic poverty involves marginalisation and cancelling the development of individual talents – added to a lack of opportunities to express individual qualities. This tends to have long-lasting effects on cognitive development when present since early postnatal days and prolonged through early adult life. Additionally, it introduces a delay in closing the gap relative to social awareness and productivity/creativity based on early and sustained high-level education and health conditions vs those generated in *relative* and *absolute* poverty. Thus, the several *statistical photographic diagnoses* of world welfare conditions provided by international organisations on multidimensional poverty open a critical inquiry on the individual and collective developmental impact – i.e., long-term consequences – on cognitive development and level of information awareness of the affected populations.

In a later publication analysing absolute and relative poverty rates, Chen and Ravallion (2012) conclude that results indicate that worsening distribution in the set of high-income countries has pushed up the incidence of relative poverty; yet, the incidence of relative poverty is now higher in the developing world than among rich countries.

Additionally, according to Ravallion and Chen (2017), whether one focuses on absolute poverty (our lower bound) or relative poverty (upper bound), the incidence of poverty is appreciably higher in the developing world. Over 90% of the poor are in the developing world.

Hence, despite some (variable) improvement, one main issue remains – the long-term consequences of such deprived conditions on child mental and physical development of a large world population. The functional handicap anticipates a stretched development process in central mental processes involved with collaborative social development. The second question attains to the institutionalised inequities and lack of equal rights in social organisation, as described previously (Colombo 2015, 2019).

Wieser et al. (2015) approached another issue: data collection in terms of dimension coverage and quality, expressed by the authors as *Data Deprivation*. According to the authors, about half of the countries – 77 of 155 – are deprived of adequate data.

Thus, besides the issue proper of poverty conditions and its impact on the brain and mental development as well as on later social competence, assessing actual worldwide conditions on equal rights starting before child delivery and continued during child developmental conditions carries a troublesome issue of data coverage and quality, which impinges on assessment of actual conditions and policy making.

The following statement by IPBES et al. (2019) stresses that given the interrelated events of the Sustainable Development Goals, current negative trends in biodiversity and ecosystems will undermine progress towards 80% (35 out of 44) of the assessed targets of goals related to poverty, hunger, health, water, cities, climate, oceans, and land.

One basic outcome of poverty involves **undernutrition**, which has a negative developmental impact at early ages, as described previously by several authors. According to the Report from UNICEF (*The state of food security and nutrition in the world*, 2022),[19] severe food insecurity has become more prevalent, with 11.7% of the global population facing food insecurity at severe levels. The number of people unable to afford a healthy diet worldwide also rose by 112 million to almost 3.1 billion, providing additional evidence that more people could not access safe, nutritious, and sufficient food. Furthermore, the report provides additional critical data on the world's nutritional condition, stating that projections are that nearly 670 million people will still be facing hunger in 2030 or 8% of the world's population. According to the report, around 2.3 billion people were moderately or severely food insecure in 2021, or nearly 30% of the global population.

*

Threats to Biodiversity

As stated in the report from *UN Environment's sixth Global Environment Outlook* (2019),[20]

> Unsustainable production and consumption patterns and trends and inequality, when combined with increases in the use of resources that are driven by population growth, put at risk the healthy planet needed to attain sustainable development. Those trends are leading to a deterioration in planetary health at unprecedented rates, with increasingly serious consequences, in particular for poorer people and regions.
>
> Furthermore, the world is not on track to achieve the environmental dimension of the Sustainable Development Goals or other internationally agreed environmental goals by 2030; nor is it on track to deliver long-term sustainability by 2050. Urgent action and strengthened international cooperation are urgently needed to reverse those negative trends and restore planetary and human health.

According to the UN climate report, the world has only a few years to stop using fossil fuels entirely,

> In the scenarios we assessed, limiting warming to around 1.5°C (2.7°F) requires global greenhouse gas emissions to peak before 2025 at the latest, and be reduced by 43% by 2030; at the same time, methane would also need to be reduced by about a third. Even if we do this, it is almost inevitable that we will temporarily exceed this temperature threshold but could return to below it by the end of the century.
>
> *(Latest report from the UN's Intergovernmental Panel on Climate Change, IPCC, 2022).*[21]

This report warns that greenhouse gas emissions could create twice as much warming – approximately 3.2°C (5.7°F) by 2100 – with the consequent impact on the threshold for a future of more fires, drought, storms, and more. Regarding methane emission, NASA has provided images of methane plumes extending for miles over various geographical locations, as illustrated below (Figure 22a and b).

> In the data EMIT (Earth Surface Mineral Dust Source Investigation) has collected since being installed on the International Space Station in July, the science team has identified more than 50 "super-emitters" in Central Asia, the Middle East, and the Southwestern United States. Super-emitters are facilities, equipment, and other infrastructure, typically in the fossil-fuel, waste, or agriculture sectors, that emit methane at high rates.[22]

Additionally,

> Antarctica's so-called Doomsday Glacier is losing ice at its fastest rate in 5,500 years, raising concerns about the ice sheet's future and the possibility of catastrophic sea level rise caused by the frozen continent's melting ice.

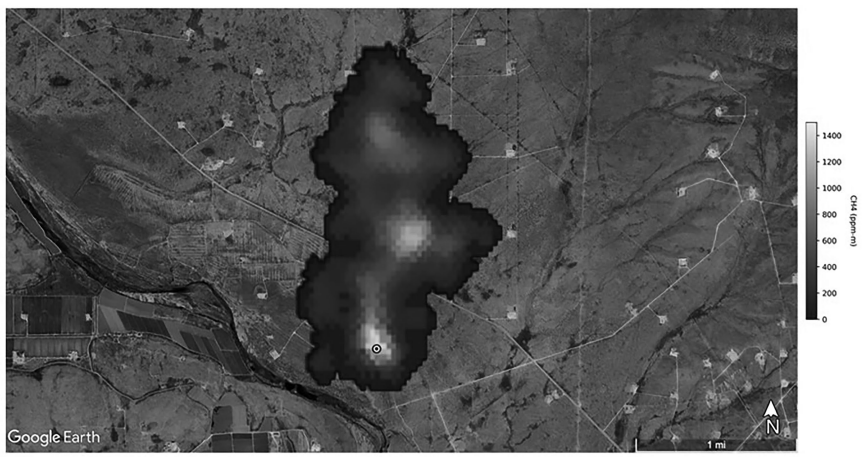

FIGURE 22 (a) Methane "super-emitters" mapped by NASA's new Earth mission/NASA. "This image shows a methane plume 2 miles (3 kilometres) long that NASA's Earth Surface Mineral Dust Source Investigation mission detected southeast of Carlsbad, New Mexico. Methane is a potent greenhouse gas that is much more effective at trapping heat in the atmosphere than carbon dioxide." (b) Methane "super-emitters" mapped by NASA's new Earth mission/NASA. "East of Hazar, Turkmenistan, a port city on the Caspian Sea, 12 plumes of methane stream westward. The plumes were detected by NASA's Earth Surface Mineral Dust Source Investigation mission, and some of them stretch for more than 20 miles (32 kilometres)." (a and b) Credit: NASA/JPL-Caltech.

> Antarctica's glacial melt, driven by climate change, is advancing faster than ever before in recorded history, researchers have reported June 9 in the journal *Nature Geoscience*.
>
> *(Braddock et al. 2022)*[23]

According to Romanello et al. (2022) in the 2022 report of the Lancet Countdown on health and climate change,

> Current policies put the world on track to a catastrophic 2.7°C increase by the end of the century. Even with the commitments that countries set in the Nationally Determined Contributions (NDCs) updated up until November 2021, global emissions could be 13.7% above 2010 levels by 2030—far from the 43% decrease from current levels required to meet Paris Agreement goals and keep temperatures within the limits of adaptation.

As Boyes (2019) reported, destructive forces driven by blindfolded profit and dominance seekers are taking an unprecedented toll on what few wild places we have left, particularly on the wildlife they sustain. On average, 200 unique species go extinct every day; it is an extinction rate that is 1,000 times faster than the natural extinction rate. (Boyes 2019; National Geographic Society Newsroom).

According to Vaughan (2020),[24] the world has missed most of its biodiversity targets, agreed upon by almost 200 governments at a 2010 UN Convention on Biological Diversity meeting in Nagoya, Japan. Only 6 out of 20 set goals for 2020 have been partially achieved.

The damage to biodiversity or the quality of life – or survival – of entire populations is not the product of the latter but privileged actors. Those who hold power or maximise the inequitable usufruct (profit) could generate changes. As described in the following excerpts, environmental conditions are declining globally at rates unprecedented in human history, with an acceleration of species extinction.

> Nature is declining globally at rates unprecedented in human history – and the rate of species extinctions is accelerating, with grave impacts on people around the world now likely, warns a landmark new report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), in Paris.
>
> *(UN 2019)*

> The diversity within species, between species and of ecosystems, as well as many fundamental contributions we derive from nature, are declining fast, although we still have the means to ensure a sustainable future for people and the planet.
>
> The Report (*for sustainable development*) finds that around 1 million animal and plant species are now threatened with extinction, many within decades, more than ever before in human history.

> 75% terrestrial environment "severely altered" to date by human actions (marine environments 66%)[25]
>
> *(Characters in cursive, added by JAC)*

The following (slightly modified) excerpts from the *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Report (2020)*, Chapter 2.2 on Status and Trends-Nature, intend to reflect on the state of the world on some dimensions of its Biodiversity.

> Though uncertainties and gaps in knowledge remain, there can be no doubt that nature is continuing to decline globally in response to direct human-caused drivers.
>
> The degree of transformation of ecosystems from natural to human-dominated varies widely across terrestrial, inland water and marine systems, and geographically within many systems. Over 30% of the world's land is now agricultural or urban, with ecosystem processes deliberately redirected from natural to anthropogenic pathways. Human drivers extend so widely beyond these areas that as little as 13% of the ocean and 23% of the land is still classified as "wilderness" – and these areas tend to be remote and/or unproductive (e.g., tundra, oceanic gyres).
>
> The rate of species extinction is already at least tens to hundreds of times higher than it has averaged over the past 10 million years, and it is set to rise sharply still further unless drivers are reduced.

In an unedited version, an IPBES Report (2019) make a series of comprehensive observations, among which are,

- Nature and its vital contributions to people, which embody biodiversity and ecosystem functions and services, are deteriorating worldwide.
- Direct and indirect drivers of change have accelerated during the past 50 years.
- Current trajectories cannot meet goals for conserving and sustainably using nature and achieving sustainability, and goals for 2030 and beyond may only be achieved through transformative changes across economic, social, political, and technological factors.

Also, according to McKinsey and Co. (2022), on the philanthropy circuit, supporting the climate and adjacencies is at the bottom of the giving list since of the $64 billion in US grant money disbursed in 2020, just 0.5% or $320 million was allocated directly to climate change.[26]

The following excerpts from the *2022 Intergovernmental Panel on Climate Change* summarise the irrational – basically profit-based – developmental race on natural resources. It should additionally be considered that climate tipping points (CTPs) occur when changes in a domain of the climate system become self-perpetuating beyond a warming threshold, leading to substantial Earth system

impacts. According to Armstrong McKay et al. (2022) analysis, the Paris Agreement's (2015) goal of limiting warming to well below 2˚C and preferably 1.5˚C is not safe, adding the collapse of the Greenland and West Antarctic ice sheets, die-off of low-latitude coral reefs, and widespread abrupt permafrost thaw.

The *2022 Intergovernmental Panel on Climate Change* summarises the irrational–basically profit-based – developmental race on natural resources that further impacts the fractured world's social and living conditions and worldwide environment. It remarks that climate change, including increases in frequency and intensity of extremes, has reduced food and water security, hindering efforts to meet Sustainable Development Goals (high confidence). Additionally, increasing weather and climate events have exposed millions of people to acute food insecurity and reduced water security. The most significant impacts are observed in many locations and communities in Africa, Asia, Central and South America, Small Islands, and the Arctic (high confidence). Climate change has adversely affected the physical health of people globally (very high confidence) and the mental health of people in the assessed regions (very high confidence). Climate change impacts on health are mediated through natural and human systems, including economic and social conditions and disruptions (high confidence).

It further states that the vulnerability of ecosystems and people to climate change differs substantially among and within regions (very high confidence), driven by patterns of intersecting socioeconomic development, unsustainable ocean and land use, inequity, marginalisation, historical and ongoing patterns of inequity such as colonialism, and governance3 (high confidence). Approximately 3.3–3.6 billion people live in contexts that are highly vulnerable to climate change (high confidence). The *2022 Intergovernmental Panel on Climate Change* additionally states that the cumulative scientific evidence is unequivocal: climate change is a threat to human well-being and planetary health. Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.

Could the combined inertial trends of corporative profit drives and cultural involvement of promoted consumerist living standards be enforced to accept a rational set of parameters that could change the above set of menaces for humankind?

*

Energy Source Conundrum: Clean Energy, Mineral Exploitation, and Marine Pollution

> Global Sea Mineral Resources is one of several companies that hopes to begin mining the seabed on an industrial scale in the coming years, perhaps as early as 2024. Some are touting the seabed as a sustainable source of the metals needed to produce batteries for electric vehicles or smartphones. Meanwhile, scientists are trying to figure out just how much ecological damage deep-sea mining would do.[27]

According to experts, clean energy requires more materials than fossil-fuel power generation. Thus, the transition towards green energy represents new opportunities for investors, based on the metals needed to fuel renewable energy, but it also implies a significant operation on mineral extraction and possibly added ecological damage.

The International Energy Agency states that a typical electric car requires six times the mineral inputs of a traditional internal combustion vehicle, and an onshore wind farm requires nine times more minerals than a gas-fired power plant. This highlights that future technological solutions depend heavily on raw material markets that are comparatively small, raising the risk that minor shortages can cause severe dislocations.[28]

Policy selection procedures are critical to reaching an actual decarbonising, clean energy system, and potential hazards that compromise the primary objective of clean and safe conditions.[29] If poorly managed, mineral development can lead to a myriad of negative consequences, including:

- Significant greenhouse gas (GHG) emissions arising from energy-intensive mining and processing activities.
- Environmental impacts, including biodiversity loss and social disruption due to land use change, water depletion and pollution, waste-related contamination, and air pollution.
- Land use change is the main source of direct and immediate impacts on people, biodiversity, and ecosystems. It can result in the displacement of communities and the loss of habitats that are home to endangered species.
- Water use in mining generally requires large volumes for its operations. It can also be a source of water contamination through acid mine drainage, wastewater discharge, or tailings disposal.
- Massive amounts of waste generation from mineral development results, both during extraction and after utilisation, some of which are hazardous to human health.

*

Marine Pollution

Concerning plastic marine pollution, according to the International Union for Conservation of Nature (IUCN) (2021),[30]

> Over **300 million tons of plastic are produced every year** for use in a wide variety of applications.
>
> At least 14 million tons of plastic end up in the ocean every year, and plastic makes up **80% of all marine debris** found from surface waters to deep-sea sediments.

> Plastic pollution **threatens food safety and quality, human health, coastal tourism, and contributes to climate change and injuries to marine species**.
>
> Under the influence of solar UV radiation, wind, currents and other natural factors, **plastic breaks down into small particles** called microplastics (particles smaller than 5 mm) or nanoplastics (particles smaller than 100 nm). The small size makes them **easy for marine life to ingest** accidentally.
>
> *(Bold letters inserted by JAC)*

A thorough analysis of the type and impact of plastic pollution in coastal and marine ecosystems is provided by Thushari and Senevirathna (2020).

*

Fisheries and Marine Life Devastation

> If, as most marine biologists believe, the oceans cannot sustain an annual catch of more than 95 million tons, the catch per person will decline steadily in the decades ahead as world population continues to grow. This also means that all future growth in demand for food will have to be satisfied from land-based sources.[2131]

The world produces around 200 million tonnes of fish and seafood every year. This comes from a combination of wild fish caught and fish farming. The rapid growth of aquaculture over the last few decades means we now produce more seafood from fish farms than from fisheries.

What is striking is that the global wild fish catch rate has not increased since the early 1990s and has remained relatively constant at around 90–95 million tonnes per year. On the other hand, fish farming is proliferating; from 1960 to 2015, it increased 50-fold to over 100 million per year.[32]

The World Trade Organisation has advocated for the abolition of harmful subsidies in the fishing industry since 2001 but has been unsuccessful. Countries drastically underreport the number of fish caught worldwide, and the numbers obscure a significant decline in the total catch.

> The new estimate, released today in Nature Communications, puts the annual global catch at roughly 109 million metric tons, about 30% higher than the 77 million officially reported in 2010 by more than 200 countries and territories. This means that 32 million metric tons of fish goes unreported every year, more than the weight of the entire population of the United States.[33]

*

Corruption

> In the field of politics, Bratsis (2003) defines corruption as the subversion of the public good by private self-interest.
>
> *(Zyglidopoulos 2015)*

Corruption implies violating material or ecological norms or increased unjustifiable profit, but it requires increased administrative and technical control. The following forthright statement on Corruption Perceptions Index by *Transparency Internationa*l (2021)[34] excuses the author from further comments,

> Overall, the Corruption Perception Index (CPI) shows that control of corruption has stagnated or worsened in 86% of countries over the last decade.

*

Comparative Investment in Research and Development (R&D)

According to the information updated through September 2021, prepared by the *Congressional Research Service (CRS),* since 2000, total global R&D expenditures have more than tripled in current dollars, from $677 billion to $2.2 trillion in 2019, though with abysmal inequalities among countries (Table 7). As mentioned by J.F. Sargent Jr. regarding the document *Global Research and development expenditures: fact sheet* (2021) prepared by the Congressional Research Service (CRS), Research and Development (R&D) plays a central role in advanced economies in areas such as economic growth and job creation, industrial competitiveness, national security, energy, agriculture, transportation, public health and well-being, environmental protection, and expanding the frontiers of human knowledge understanding.

Thus, the following figures (Table 8) on research and development expenditures are a crude, direct reflection of the gross inequality in national development and indirectly on the relative world power and potential prevalence of political and market dominance.

In terms of growth in R&D expenditures since 2000, the following graphs (Figures 23–25) illustrate the comparative standings among nations.

*

Considering the above data on the state of the world regarding its population subsumed into inhuman – subhuman – non-competitive conditions for labour opportunities, non-educated, non-informed, non-able to pull out from their living conditions, several options arise to modify them. Perhaps the first one is to *fill in the tank* of budget support aimed at health, education, cognitive

TABLE 8 Countries with the highest expenditure on R&D, 2019 (In billions of current PPP dollars)

Rank/country amount	*Rank/country amount*
1. United States $657.5	11. Canada $29.3
2. China $525.7	12. Spain $24.9
3. Japan $173.3	13. Turkey $24.2
4. Germany $147.5	14. Australia $22.4
5. South Korea $102.5	15. Netherlands $22.3
6. France $72.8	16. Sweden $19.3
7. United Kingdom $56.9	17. Israel $18.7
8. Russia $44.5	18. Switzerland $18.6
9. Taiwan $44.0	19. Belgium $18.2
10. Italy $38.8	20. Poland $17.2

Source: CRS analysis of Organisation for Economic Development and Cooperation, OECD.

Notes: PPP = Purchasing Power Parity. PPP is used to determine the relative value of different currencies and to adjust data from different countries to a common currency allowing direct comparisons among them. https://stats.oecd.org/Index.aspx? DataSetCode=MSTI_PUB.

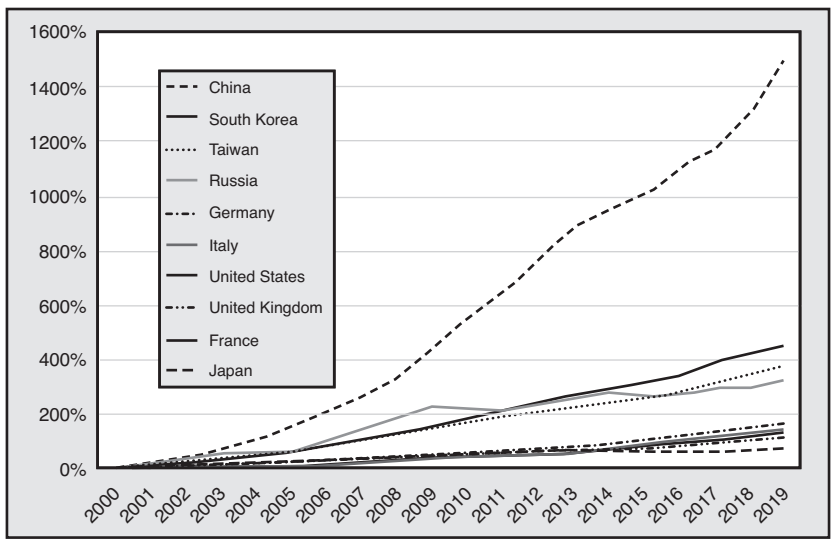

FIGURE 23 Growth in R&D expenditures since 2000 for selected countries, 2000–2019.
Source: CRS analysis of Organisation for Economic Development and Cooperation, OECD (https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB).

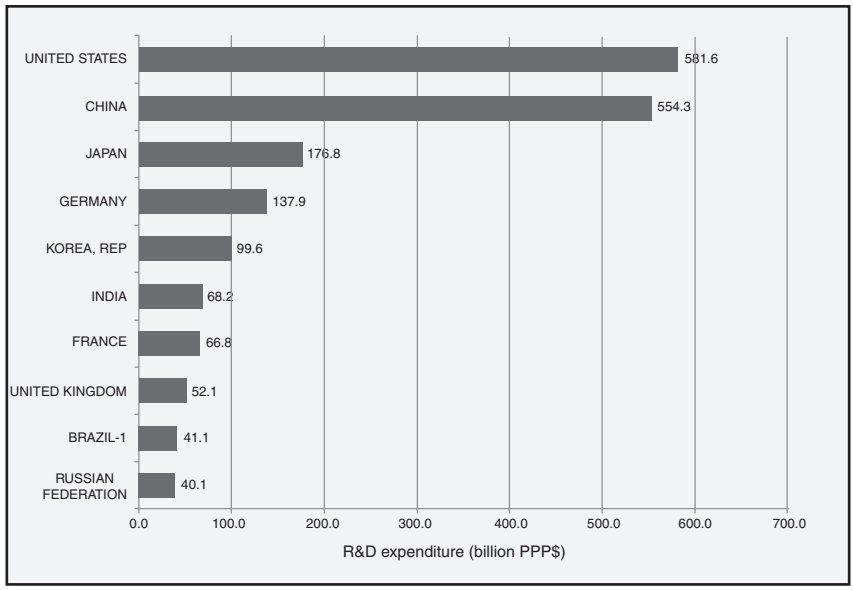

FIGURE 24 World's top ten leaders in R&D investment. GERD (billion PPP$), 2018, or the latest year available (2017).

Source: UNESCO Institute for Statistics, June 2020 (http://uis.unesco.org/sites/default/files/documents/fs59-global-investments-rd-2020-en.pdf).

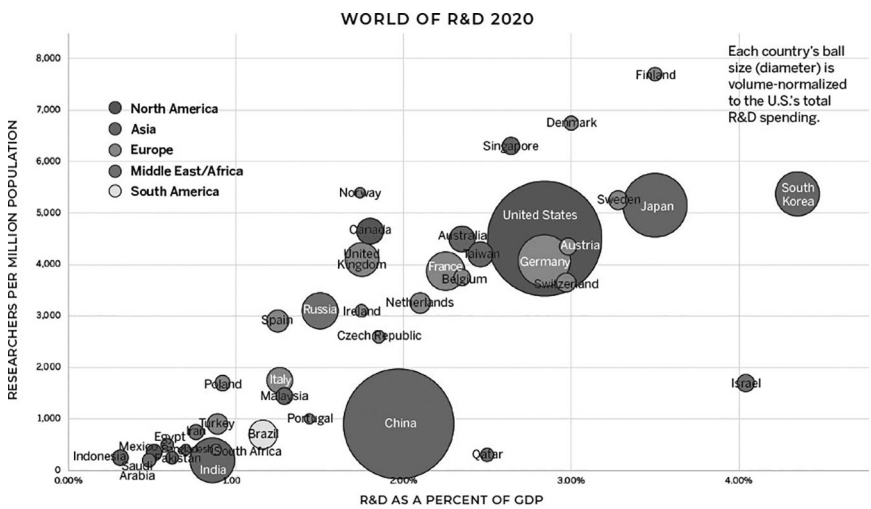

FIGURE 25 World distribution of researchers and research spending.

Source: World of Research and Development (R&D World, 2020) (https://www.rdworldonline.com/wp-content/uploads/2020/03/Figure-2-1.jpg).

enhancement, and social insertion in a productive, self-sustained manner. This implies rearranging priorities of corporate wealth and budgetary and technological developmental goals applied to earthbound conditions. Until these objectives are met, other projects related to supernovas, interstellar gas, or colonising Mars should be postponed but not erased from future projects and detached from international power competitive goals – a hypothetical, highly desirable role for the UN. In other words, first, humanising our world's living conditions ought to be the first investment priority. Our planet's fragmented social, cultural, and political composition involves a historic inertial cultural construction with differences in priorities, values, and beliefs, from which economic inequalities evolve.

As stated in the report from *The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)* (2019), economic inequality across all countries has been rising since 1820 and has escalated since 1980, with the highest-income countries increasing their incomes faster. In 2017, the gross domestic product (GDP) per capita was nearly four times higher in developed than in developing countries and nearly 34 times higher than in the least developed countries.

*

Let us then return to the basic notion that the planet's population and educational standards are not equally distributed among communities or states – nor are most of them intrinsically egalitarian – and that the notion of predominance or maximisation of comparative advantages is central in the relationship between nations. It is revealing to trace the configuration and history track of imperial campaigns, multinationals, monopolies or oligopolies, or the association of corporate interests with the governments of the day or with potential governments. In addition, to point out the power prevalence provided by nuclear weapon development, the creation of a control body constituted by the nuclear powers themselves to limit the proliferation of these weapons, or the objectives and the budget for space exploration in a disjointed condition of the planet population. The latter requires the application of other standards of living conditions to reach an equitable development and limited spending on the arms race. These asymmetries make the concept of *globalisation* more a matter of cliché than of operational reality and limited to political and financial strata. There can be no true globalisation in a planetary community that is so unequal, so asymmetrical, and where the flow of information and access to shared wealth and education occurs within specific cultural or power niches or strata (see Figure 1 in Colombo 2021a). Also, where the eternal question regarding information contents and availability subsists: what validity or credibility does the information provided by the national or international media have? Are we not driven to construct "reality" based on vested sectorial interests?

Once again, *globalisation* arises more from oversizing and manipulating the impact of information as an instrument rather than humanity integrated by that

instrument. It serves to interact with stock markets and financial transactions between large companies or to mobilise specific social segments behind commercial or political slogans of the day. However, let us think about the people; one issue is to "globalise the markets," and another is to "globalise humanity" in terms of the probability of accessing information and education required for its interpretation.

Figure 26 and Table 9 illustrate corporate wealth's concentrated and national distribution. This financial power expands into conditioning political decisions,

TABLE 9 The 25 largest multinational companies 2017

Ranked by public company sales
(billions of dollars)

Market capitalization	Company (nationality)	Industry	Profits	Sales
221.1	**Walmart Stores** (U.S.)	retail sales	13.6	485.3
105.1	**China Petroleum &Chemical** (China)	energy	7	255.7
171.9	**Toyota Motor** (Japan)	automobile	17.1	249.9
72.9	**Volkswagen Group** (Ger.)	automobile	5.7	240.3
228.8	**Royal Dutch Shell** (Neth.)	energy	4.7	234.8
409.9	**Berkshire Hathaway** (U.S.)	finance	24.1	222.9
752	**Apple** (U.S.)	electronics	45.2	217.5
204.5	**PetroChina** (China)	energy	1.2	214.8
343.2	**ExxonMobil** (U.S.)	energy	7.8	197.5
30.5	**McKesson** (U.S.)	saahealthnté	2	196.5
160.2	**UnitedHealth Group** (U.S.)	health	7.2	184.9
114.7	**BP** (U.K.)	energy	0.115	183.8
79.8	**CVS Health** (U.S.)	health	5.3	177.5
254.3	**Samsung Electronics** (South Korea)	electronics	19.3	174
76.1	**Daimler** (U.S.)	automobile	9.4	169.5
5 0.8	**General Motors** (U.S.)	automobile	9.4	166.4
249.3	**AT&T** (U.S.)	electronics	13	163.8
57.3	**Glencore Int.** (Switz.)	mining	–0.453	153.7
11.9	**EXOR** (Italy)	finance	0.483	152.6
44.7	**Ford Motor** (U.S.)	automobile	4.6	151.8
229.8	**ICBC** (China)	banking	42	151.4
19	**Amerisource Bergen** (U.S.)	health	1.3	148.3
43.2	**China State Construction Engineering** (China)	construction	4.9	140.8
427	**Amazon.com** (U.S.)	retail sales	2.4	136
54.4	**Hon Hai Precision** (Taiwan)	electronics	4.6	135.2

@FNSP - Sciences Po, Atelier de cartographie, 2018

Source: Forbes The World's Biggest Public Companies 2017 Ranking.
Note: www.forbes.com.

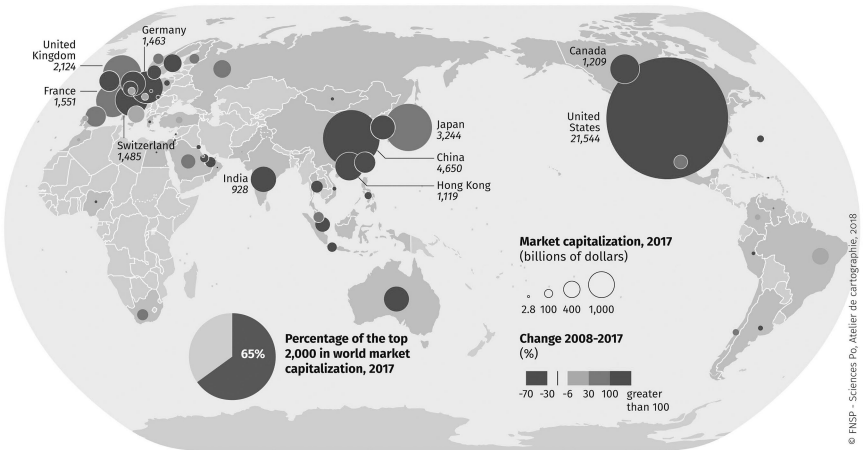

FIGURE 26 The 2,000 largest multinational companies, 2008–2017.
Source: Espace Mondial L'Atlas (https://espace-mondial-atlas.sciencespo.fr/en/topic-strategies-of-transnational-actors/map-3C25-EN-the-2000-largest-multinational-companies-2008–2017.html).

public needs, and material values and carving future directions and pace of worldwide development.

On the map of the stock market capitalisation of the 2,000 major multinational companies in 2017, the size of the circles is proportional to their weight in terms of stock market capitalisation. The weight of US firms can be seen (44%, compared with 22% for all European firms). The range of colours indicates the progress made over the last decade: in addition to the growth of US companies, an increase in those of emerging Asian countries is visible when some European, Japanese, and Latin-American firms are stagnating.

According to the annual ranking of companies by the US economic magazine Forbes, this diagram shows the sector of activity, stock market capitalisation, turnover (according to which the ranking is decided), and profits of the 25 major multinational companies in 2017. Multinationals in the energy/raw materials and automobile sectors remain the most numerous, but finance and electronics occupy the top ranks in profits. Seven Asian multinationals appear in this category, representing a quarter of the total in number and stock market capitalisation.[35]

*

If the main driver for entrepreneur and creative motivations is "profit" or financial and market dominance – involving the promotion of questionable basic needs and consumer behaviour – it would confirm that we have fallen within an additional *evolutionary trap*, unable to master basic, ancient animal dominance/prevailing drives moulded under human cultures. To put it straightforwardly,

leadership based on wealth, inheritance, and corporate, financial/religious, or mystic group interests will close our chances to promote behavioural changes aimed at fostering human values based on shared interests and solidarity. The above power sources mould an emotional background that works as a fishhook for vested profit and control interests by blindfolding or hazing people's ability to cognitively evolve and apply their functional access to information and analysis capacities.

Let us not fall into the trap of hiding or obscuring human values such as creativity, equal opportunities, and solidarity under the pressure of such vested, profit, and control interests.

On ecological grounds, as claimed by Wang et al. (2021), there is an urgent, unavoidable need for a global science-policy body for the control of chemicals and waste. The need for environmentally safe, ecologically sound international policies on the exploitation of natural resources should also be added.

***

Notes

1 https://wir2022.wid.world/.
2 https://datatopics.worldbank.org/world-development-indicators/stories/societal-poverty-a-global-measure-of-relative-poverty.html.
3 https://wir2022.wid.world/chapter-1/.
4 https://wir2022.wid.world/chapter-1/.
5 https://www.stockholmresilience.org/research/planetary-boundaries.html.
6 https://www.newscientist.com/article/2311097-amazon-rainforest-nears-tipping-point-that-may-see-it-become-savannah/?utm_source=nsday&utm_medium=-email&utm_campaign=NSDAY_080322.
7 https://www.newscientist.com/article/2317662-global-forest-destruction-continues-despite-cop26-deforestation-pledge/?utm_source=nsday&utm_medium=email&utm_campaign=NSDAY_290422.
8 https://www.worldbank.org/en/news/factsheet/2022/05/02/fact-sheet-an-adjustment-to-global-poverty-lines#1.
9 https://ourworldindata.org/extreme-poverty.
10 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Living_conditions_in_Europe_-_poverty_and_social_exclusion.
11 https://www.worldvision.org/sponsorship-news-stories/global-poverty-facts#facts.
12 https://ourworldindata.org/grapher/poverty-share-on-less-than-30-per-day?country=IND~DNK~KOR~ESP~POL~NOR.
13 https://ourworldindata.org/extreme-poverty.
14 https://devinit.org/resources/poverty-trends-global-regional-and-national/#:~:text=In%202021%20an%20estimated%20698,live%20below%20%245.50%20a%20day.
15 https://devinit.org/resources/poverty-trends-global-regional-and-national/#:~:text=In%202021%20an%20estimated%20698,live%20below%20%245.50%20a%20day.
16 https://datatopics.worldbank.org/sdgatlas/goal-1-no-poverty/.
17 http://www.systemicpeace.org/CTfigures/CTfig01.htm.
18 https://www.theguardian.com/commentisfree/2019/jan/29/bill-gates-davos-global-poverty-infographic-neoliberal.

19 https://data.unicef.org/resources/sofi-2022/?utm_source=newsletter&utm_medium=email&utm_campaign=SOFI+2022.
20 https://www.unep.org/resources/global-environment-outlook-6?_ga=2.184403567.812519050.1642232309-565299822.1642232309.
21 https://www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease/.
22 https://www.nasa.gov/feature/jpl/methane-super-emitters-mapped-by-nasa-s-new-earth-space-mission.
23 https://www.livescience.com/penguin-bones-reveal-secrets-of-ddomsday-glacier?; https://doi.org/10.1038/s41561-022-00961-y.
24 https://www.newscientist.com/article/2254460-massive-failure-the-world-has-missed-all-its-biodiversity-targets/#ixzz6YBQbSw00.
25 https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/.
26 https://www.mckinsey.com/featured-insights/coronavirus-leading-through-the-crisis/charting-the-path-to-the-next-normal/money-matters.
27 https://www.nationalgeographic.com/environment/article/proposed-deep-sea-mining-would-kill-animals-not-yet-discovered?rid=95527DDF86250D8AB073474627963407&cmpid=org=ngp::mc=crm-email::src=ngp::cmp=editorial::add=Planet_Possible_20220405.
28 https://www.cnbc.com/2022/02/27/these-metals-are-key-to-future-tech-heres-how-to-invest-in-them.html.
29 https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/sustainable-and-responsible-development-of-minerals.
30 https://www.iucn.org/resources/issues-briefs/marine-plastic-pollution.
31 Worldwatch Institute. State of the World 2000. *A Worldwatch Institute Report on Progress Toward a Sustainable Society*. Norton & Co.
32 https://ourworldindata.org/fish-and-overfishing#wild-fish-catch.
33 https://www.seaaroundus.org/study-finds-30-per-cent-of-global-fish-catch-is-unreported/.
34 https://www.transparency.org/en/news/cpi-2021-highlights-insights.
35 https://espace-mondial-atlas.sciencespo.fr/en/topic-strategies-of-transnational-actors/article-3A11-EN-multinational-corporations.html.

9

DOMINANCE AND THE HUMAN DEVELOPMENT OF *THE EVOLUTIONARY TRAP*

Life in the natural kingdom is based on strategies aimed at securing feeding and reproductive means for individual and kin survival. Not alien to this strategy are physical means and hunting tactics. Basically, survival engendered forms of violence, whether through frontal competition or subtle strategies. Hence, it should not be surprising that our species' survival also requires physical conditions and adequate behavioural patterns. Thus, encounters must have occurred between and within the *Homo* species – and other contemporary animal species – for territorial, feeding, and group dominance purposes. Hence, intra- and inter-group struggles with different outcomes were probably frequent. According to Sala et al. (2015), since lethal interpersonal violence is ancient human behaviour, it has important implications for the accumulation of bodies at the site, supporting an anthropic origin.

The development of physical and instrumental means secured its prevalence in dealing with hunting and defence. However, it also generated intra-group casualties, with occasional evidence of lethal interpersonal violence in the hominin fossil record, though interpersonal violence has been documented previously in Pleistocene members of the genus *Homo*, as stated by Sala et al. (2015). Churchill et al. (2009) analyse the case of a penetrating lesion to the left ninth rib of the Shanidar 3 Neanderthal, which has been a focus of discussion about interpersonal violence and weapon technology in the Middle Palaeolithic. As stated by Walker (2001), throughout the history of our species, interpersonal violence, especially among men, has been prevalent. Cannibalism seems to have been widespread, and mass killings, homicides, and assault injuries are also well documented in both the Old and New Worlds. Additionally, it states that no form of social organisation, mode of production, or environmental setting appears to have remained free from interpersonal violence. Walker (2001) quotes Dart

DOI: 10.4324/9781003387695-9

(1953) asserting that – based on osteological analysis – the earliest humans were confirmed killers and carnivorous, cannibalistic creatures.

According to Bello et al. (2015), data from Palaeolithic remains in Gough's Cave (Somerset, UK) underscore that nutritional cannibalism was practised by Neanderthals, perhaps under ritualistic contexts, based on the presence of tooth marks, though skulls would be modified to produce skull-caps. This practice has been further analysed by Rougier et al. (2016) with remains from the *Troisième Caverne* of Goyet (Belgium) dated at 40,500–45,500 cal BP and by Bello et al. (2017) at Gough's Cave, the latter authors stating that,

> Cut-marked and broken human bones are a recurrent feature of Magdalenian (~17–12,000 years BP, uncalibrated dates) European sites. Human remains at Gough's Cave (UK) have been modified as part of a Magdalenian mortuary ritual that combined the intensive processing of entire corpses to extract edible tissues and the modification of skulls to produce skull-caps.

According to these authors, these modifications indicate thorough de-fleshing and dismembering of skulls and long bones, as well as processing to extract bone marrow and brain. They further state that,

> ... what is exceptional in this case, however, is the choice of raw material (human bone) and the cannibalistic context in which it was produced. The sequence of the manipulations suggests that the engraving was a purposeful component of the cannibalistic practice, implying a complex ritualistic funerary behaviour that has never before been recognised for the Palaeolithic period.

*

Interpersonal violence comprising violent interpersonal interactions and murder among the earliest modern Europeans during the Upper Palaeolithic period is mentioned by Kranioti et al. (2019), associated with intensified technological innovation, increased symbolic behaviour, and cultural complexity.

Though it should be said that the enthusiastic and vivid description by Dart (1953), quoted by Walker (2001), appears to be foreign to the objective description, case reports provide evidence regarding the history of human aggression. As Walker (2001) mentions,

> it shows that the roots of interpersonal violence behaviour penetrate deep into the evolutionary history of our species.

These descriptions set up the horizon of the history of our modern world, plagued with terminal or dominating physical encounters of different magnitudes

and means (see Chapter 11). Through this kind of violent means, humans have modified or annihilated ancestral cultures, imposed dominance through economic, political, or religious means, or subjected to slavery or poverty and detachment from the cognitive and wealth development of millions of world inhabitants. Hence, dominance and prevalence have been core movers of human behaviour, whether at the individual or collective dimensions. In this regard, the comments advanced by Zollikofer et al. (2002) regarding the Neanderthal behavioural balance between interpersonal aggressive and cooperative tool-mediated behavioural patterns were largely similar to early modern humans.

According to Kranioti et al. (2019), the Cioclovina (Romania) calvaria dated to ca. 33 cal ka BP would indicate a fatal injury due to two incidents of blunt force trauma, the second clearly inflicted with a club-like object.

Considering the relatively scant retrieval of *Homo* and early *Homo sapiens* remains, the reduced number of fossils constrains the real appraisal of the incidence of interpersonal aggression among *Homo* individuals. Yet, natural history events and the scarce available data suggest that interpersonal aggression – whether intra or intergroup – conforms trails of a behavioural drive among humans that became more manifest and traceable in modern history.

*

Warmongers and Arms Production. Military Spending. Wars and Uprisings in Human History

Linger not, stranger. Shed no tear.
Go back to those who sent us here.
We are the young they drafted out
To wars their folly brought about.
Go tell those old men, safe in bed,
We took their orders and are dead
(War Poems on the Underground[1])

Besides isolated aggressive encounters, war represents a collective deviant and degraded animal behaviour performed by coalitions involving ancient drives linked to dominance, territorial/belief/religious/profit prevalence, basic response to survival needs, and feelings of historical/cultural pertinence.

The history of our species has vanished for an extended period since its original existence. Ancient tribal and city conflicts due to dominance or prevalence upon territorial, food, and dominance claims left no records until they became resistant to oblivion (see Appendix for a chronological listing of wars and struggles among states and nations). A summary of these continuous, distributed events suggests some figure estimates had there been an available record of them: 193 Empires[2] and 190 wars between 1573 and 1997.[3] From this source, it has been estimated that from 1,000 CE (common era) through 2,000 CE, wars resulted in

148 million victims. Later wars with new technologies involving potential heavy casualties among civilians and the menace of new multinational wars have placed our species' survival and collective evolution at risk.

The following graphs illustrate some of these comments. Perhaps to be noted are the opposite trends of arms conflicts among those based on interstate and civil conflicts, with and without foreign intervention (Figure 27), and the increased number of refugees and immigrants due to conflicts (Figure 28). According to the UN Refugee Agency (UNHCR) (2021), 89.3 million people were forcibly displaced due to persecution, conflict, violence, or human rights violation.

According to the World Economic Forum (2022),

> At the end of 2021, 89.3 million people worldwide had been forced to flee their homes, and the number of displaced people has now reached 100 million… it has been estimated that one billion people are at risk of being displaced by 2050 due to environmental change, conflict and civil unrest.

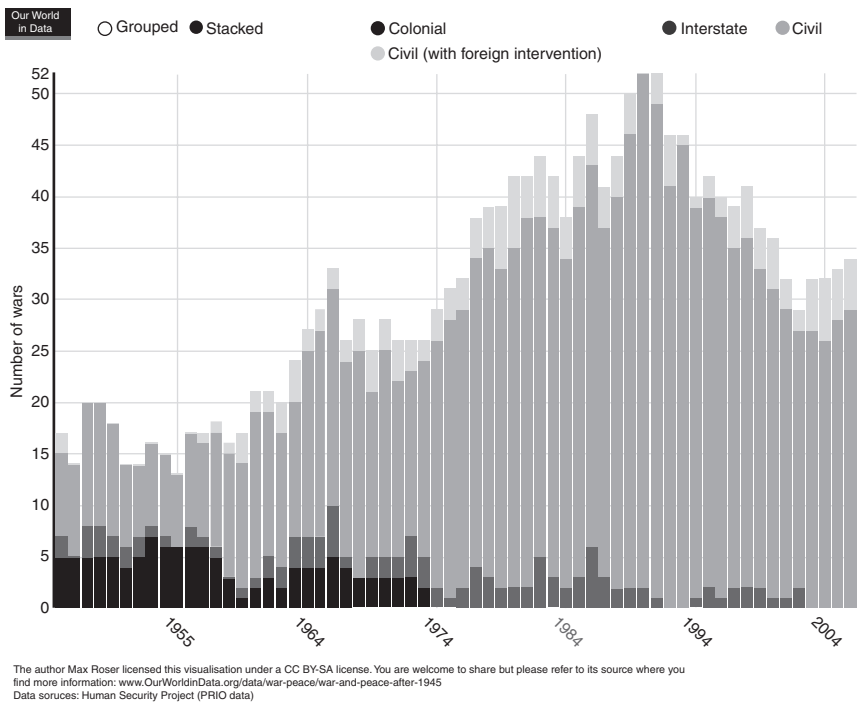

FIGURE 27 Number of state-based armed conflicts, 1946–2007.

Source: Our World in Data (https://geographicalimaginations.files.wordpress.com/2014/08/state-based-armed-conflicts.png).

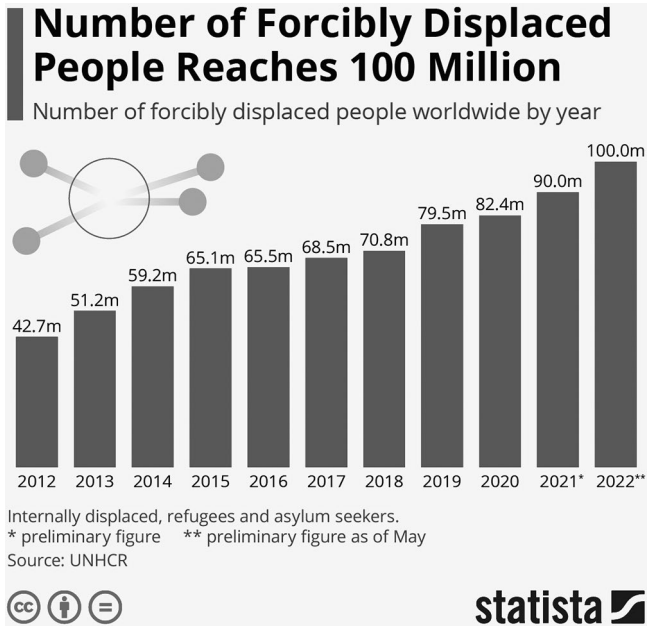

FIGURE 28 Conflict is a principal driver of human displacement and the increasing number of refugees.

Source: UNHCR (https://www.statista.com/chart/18423/forcibly-displaced-worldwide-timeline/).

International terrorism attacks show a bimodal curve up to 2008, while revolutionary and ethnic conflicts show a stable high incidence.

According to *Systemic Peace* regarding the post-Cold War effects, the trend on the general level of armed conflict in the global system appears to have changed in the mid-2000s back to an increasing trajectory.[4]

These comments intend to sketch the continuous expression of humankind's warmonger components that draw communities into a continuous struggle for dominance and survival through *fight or flight* (refugees) behaviours. The ancient expression of animal drives for dominance and prevalence within the animal kingdom emerges under these universal profile components.

*

Does the integration of international blocks respond to common views of world affairs and forms of living, or do they represent opportunistic alliances to acquire political and military standings able to confront similar blocks? A representation of several indices of the world's affairs (as expressed in the accompanying figures) would seem that the latter is a plausible possibility. As summarised previously by Colombo (2019), human drives affect other living species as well:

- This spring, the UN released a shocking report: up to 1 million species are at risk of going extinct in a matter of years. Moreover, this extinction crisis is primarily driven by human activity. This report clarified:

  > Our planet is out of balance, and we need to work together NOW to create a sustainable planet for generations to come.[5]

- The destructive force of humankind is taking an unprecedented toll on what few wild places we have left, particularly on the wildlife they sustain. On average, 200 unique species go extinct every day; it is an extinction rate that is 1,000 times faster than the natural extinction rate.
- According to a recent IPBES report, over 1 million species are at risk of extinction. We urgently need to protect the places that are the last strongholds of global biodiversity and wildlife. If these wildernesses are compromised, we have no backup plan.[6]
- These drives and trends have a long history. Unless a cultural revolution fences them and proposes new cultural parameters, collective and ecological damage will keep progressing to the point of no return.

Military spending is one indicator of current perspectives, as described in the following excerpts.

> In 2019, the latest year for which figures are available, global military spending stood at $1.917 trillion, according to analysis by academics at the Stockholm International Peace Research Institute.[7]
>
> According to the Stockholm International Peace Research Institute (2006),[1] world military spending in 2005 represented one thousand billion dollars (at a constant value for the year 2003), a figure that according to the Global Policy Forum[2] would amount to eight hundred thousand million annually. According to the first source, this represents approximately 2.5% of the world's gross product. While the United States of America is responsible for almost fifty percent of these expenses,[3] the United Nations is responsible for two percent. Such total expenditures represent more than the annual income of the poorest 45 percent of the world's population.[8]

The trends in international transfers of major weapons hand military expenditures had a dwindling profile, with a later increase as shown in Figures 29 and 30, according to the Stockholm International Peace Research Institute (SIPRI) (2018).

According to SIPRI, the five biggest exporters – the United States, Russia, France, Germany, and China – together accounted for 74% of all arms exports in 2013–2017, in which the United States represented 34%. Exports to states in the Middle East accounted for 49% of US arms exports. Major arms exporters were the United States, Russia, France, Germany, and China (Figure 31).[9]

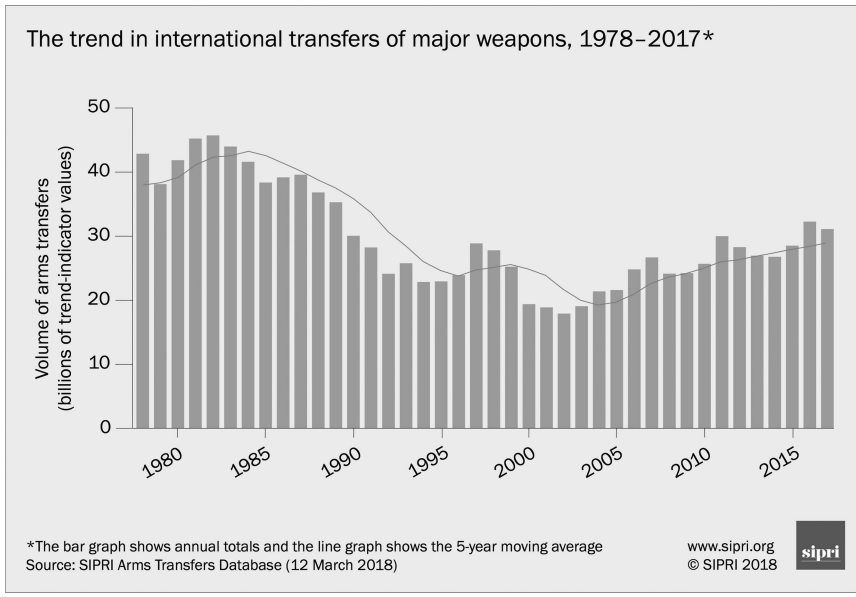

FIGURE 29 The trend in international transfers of major weapons, 1978–2017.
Source: SIPRI (https://www.sipri.org/sites/default/files/2018-03/fssipri_at2017_0.pdf).

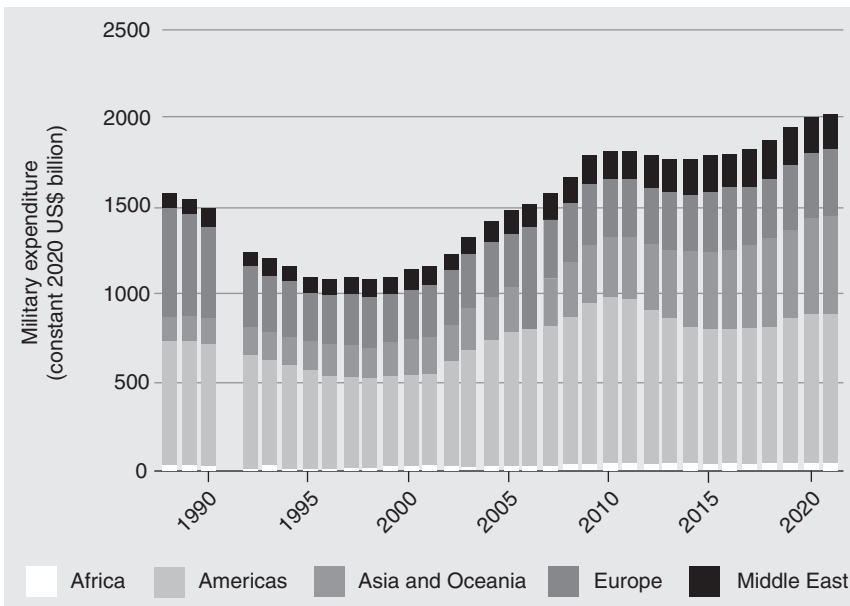

FIGURE 30 World military expenditure by region 1988–2021.
Source: SIPRI (https://sipri.org/media/press-release/2022/world-military-expenditure-passes-2-trillion-first-time).

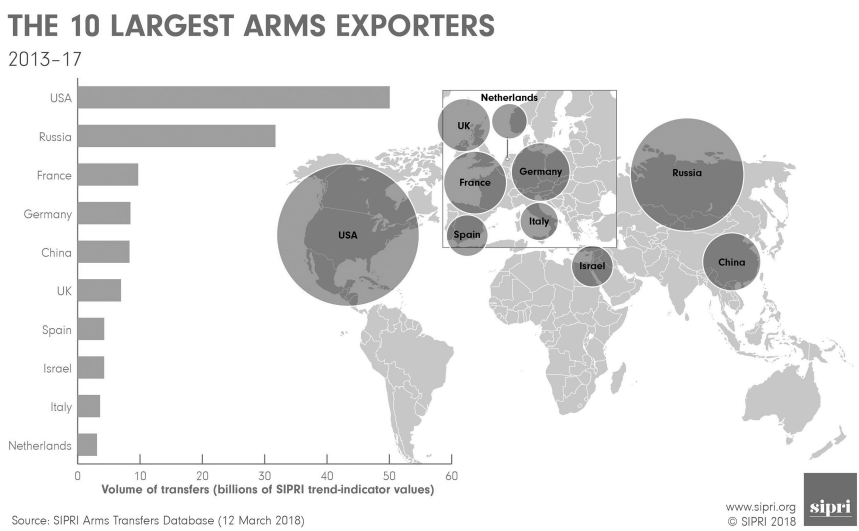

FIGURE 31 Largest arms exporters.
Source: SIPRI (2018).

According to the same source, the world spends an estimated $1.7 trillion yearly on war (SIPRI 2018). In comparison, global humanitarian funding is 1.3% of that (Financial Tracking Service 2022). According to the Stockholm International Peace Research Institute (SIPRI), international weapon sales worldwide have jumped by 10% in the last four years compared to 2008–2012.

A full report for this period can be found in SIPRI (2018).[10] Comparing budget expenditures in arms versus global humanitarian funding according to SIPRI (2018), the latter represented 1.3% (Financial Tracking Service 2022) of the former.[11]

According to Bowler (2018),[12] the US's arms exports are 58% higher than Russia's, the world's second-largest exporter. Furthermore, while US arms exports grew by 25% in 2013–2017 compared with 2008–2012, Russia's exports fell by 7.1% over the same period.

Though India is also spending more, its defence imports rose 24% between 2008–2012 and 2013–2017, Saudi Arabia is now the world's top importer of US arms, and China is planning four aircraft carrier battle groups in that same period, according to the same source (Figure 31, Table 10). According to the Pentagon's annual China military report estimates, with 355 ships in its fleet, the People's Liberation Army Navy (PLAN) is slated to expand its inventory to 420 ships within the next four years, rising to 460 ships by 2030.[13] According to Newsweek (2022),[14] the United States has far greater carrier power, though, with 11 aircraft carriers.

Based on data from Al-Jazeera,[15] India, Saudi Arabia, and the United Arab Emirates were the most prolific importers of major weapons.

TABLE 10 Largest navies in the world 2022

Country	*Total warships*	*Submarines*
China	777	79
Russia	603	64
North Korea	492	36
United States	490	68

Note: https://www.sipri.org/sites/default/files/2018-03/fssipri_at2017_0.pdf.

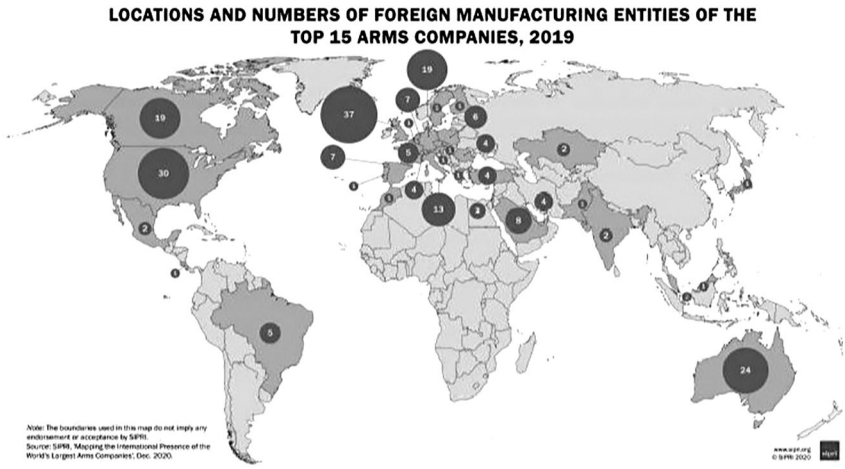

FIGURE 32 Locations and numbers of foreign manufacturing entities of the top 15 arms companies (SIPRI 2021).

According to the data released by SIPRI (2020), sales of arms and military services by the industry's 100 largest companies totalled $531 billion in 2020 – an increase of 1.3% in real terms compared with the previous year (Figure 32).[16]

According to SIPRI (2021), many large US arms companies are opting to merge or acquire promising ventures to broaden their product portfolios and thus gain a competitive edge when bidding for contracts adding,

> ...Together, the arms sales of the 41 US companies amounted to $285 billion—an increase of 1.9% compared with 2019—and accounted for 54% of the Top 100's total arms sales. Since 2018, the top five companies in the ranking have all been based in the USA.

This trend is particularly pronounced in the space sector.[17]

Comparative increases in arms sales between 2002 and 2020 are summarised in Table 11.

TABLE 11 Total arms sales for the SIPRI Top 100, 2002–2020

	2020	*2002–2020*
Current US$ (billion)	531	
% Change	2.4	164
Constant 2020 US$ (billion)	531	
% Change	1.3	79

Source: SIPRI Arms Industry Database, Dec. 2021.
Note: https://www.sipri.org/sites/default/files/2021-12/fs_2112_top_100_2020.pdf.

Hence, if nuclear and outer space technology and communicational developments are included under the concept of a dominance race, they are all concentrated in a handful of countries or corporative initiatives. These developments are concentrated in a handful of countries with dominance power over the remaining nations.

*

Nuclear Weapons

Regarding nuclear weapons (Figure 33), as of 2022, about 12,700 nuclear warheads are still in existence, of which more than 9,400 are attached to missiles, aircraft, ships, and submarines.[18] However, besides an apparent limitation in nuclear weapons proliferation, other technologies (e.g., see below on Starlink) and deployment strategies place the world at risk of a false stalemate.

The availability of reliable information on the status of the nuclear arsenals and capabilities of the nuclear-armed states varies considerably. The United States, the United Kingdom, and France have declassified some information. Russia refuses to publicly disclose the detailed breakdown of its strategic nuclear forces, even though it shares the information with the United States. China releases little information about force numbers or future development plans. The governments of India and Pakistan make statements about some of their missile tests but provide no information about the status or size of their arsenals. North Korea has acknowledged conducting nuclear weapons and missile tests but provides no information on the size of its nuclear arsenal. Israel has a long-standing policy of not commenting on its nuclear weapon store.

According to the Stockholm International Peace Research Institute's *SIPRI Yearbook 2022*, which assesses the current state of armaments, disarmament, and international security, a key result is that despite a marginal decrease in the number of nuclear warheads in 2021, nuclear weapon stores are expected to grow over the coming decade.[19] Although the total number of nuclear weapons declined slightly between January 2021 and January 2022, the number will probably increase in the next decade. According to Wilfred Wan, Director of

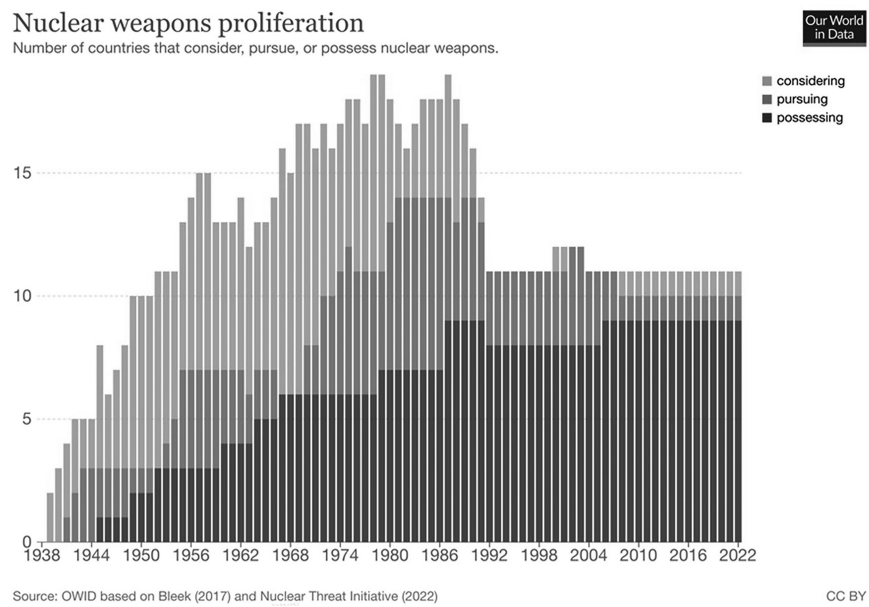

FIGURE 33 Nuclear weapons proliferation.
Source: OWID (Our World in Data) based on Bleek (2017) and Nuclear Threat Initiative (2022).

SIPRI's Weapons of Mass Destruction Program, all the nuclear-armed states are increasing or upgrading their arsenals, and most are sharpening nuclear rhetoric and the role nuclear weapons play in their military strategies.

It would be sombre to confirm that some rocket payloads would carry a clandestine government payload, as stated in the report *SpaceX launches Globalstar satellite on mysterious Falcon 9 mission*, by William Graham (June 18, 2022).[20]

Additional relative strategic power involves speed and geographical coverage of communication networks. The above-mentioned expanded weapons investment capabilities do not include the tremendous impact that orbital and extraterrestrial technological development implies in relative strategic power upstaging.

Competition for the extraterrestrial domain triggered a race for a constellation of low Earth orbit satellites of multipurpose applications in terms of communication speed and geographical coverage. The following excerpts indicate the expanding technological progress in satellite communication resources applied to conflict regions, staging a sombre future with its escalation, should it not act as a mutual deterrent, a menacing unstable equilibrium as the world faces additional developments in this domain,

> In an announcement published this month, the service said that US Air Forces Europe-Air Forces Africa would purchase service from Starlink, which is operated by SpaceX, to support the 86th Airlift Wing based at

> Ramstein Air Base in Germany. The 12-month, $1.92 million contract was awarded in late July and is set to begin sometime between August and July 2023. It is meant as "an interim solution" until a broader agreement is reached.
>
> *(Business Insider 2022)*[21]

> Laser inter-satellite links (LISLs) are envisioned between satellites in upcoming satellite constellations, such as Phase I of SpaceX's Starlink. Within a constellation, satellites can establish LISLs with other satellites in the same orbital plane or in different orbital planes.
>
> *(Chaudhry and Yanikomeroglu 2021)*[22]

The increase of satellites at low terrestrial orbits has raised NASA concerns.[23] However, there is "room for *tens of billions* of spacecraft orbiting the Earth," according to the Tesla founder.[24] In the meantime, China has launched a new satellite, an "important step" towards a global quantum communications network.[25] Concerned citizens are watching what seems to be an expanded version of ancient races aimed at increasing world dominance, whether of commercial or military nature or information control.

***

Notes

1 https://rickrozoff.wordpress.com/2014/04/30/a-d-hope-inscription-for-a-war/.
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23 https://www.space.com/nasa-collision-risk-starlink; https://spacenews.com/nasa-outlines-concerns-about-starlink-next-generation-constellation-in-fcc-letter/.
24 https://www.scmp.com/news/china/science/article/3161611/elon-musk-denies-spacex-satellites-are-blocking-space-wake?module=perpetual_scroll_1&pgtype=-article&campaign=3161611.
25 https://www.scmp.com/news/china/science/article/3186802/china-launches-new-satellite-important-step-towards-global?module=perpetual_scroll_0&pgtype=article&campaign=3186802.

10

WASTE MANAGEMENT AND QUALITY OF LIFE

According to the Worldwatch Institute Report on The State of the World (2000),[1] global economic trends during the 1990s were remarkably bullish, but environmental trends were disastrous. The contrast could scarcely be more significant. An economic system that worked well in times past when the demands of a smaller economy were well within the capacities of Earth's ecosystems is no longer so. If the trends outlined in the last section cannot be reversed, we face a future where continuing environmental deterioration almost certainly will lead to economic decline. It also states that the main reason environmental treaties have so far mostly failed to turn around today's alarming environmental trends is that the governments that created them have generally permitted only vague commitments and lax enforcement. For the most part, governments have also failed to provide sufficient funds to implement treaties, particularly in the developing world.

*

Waste Production

According to the World Bank (2018), global waste would have increased by 70% without urgent action by 2015. The report affirms that driven by growing populations, the global annual waste is expected to increase from 2.01 billion tonnes in 2016 to 3.4 billion tonnes within the next 30 years. High-income countries combined are generating 34% of the world's waste.[2]

Hazardous waste by leading industrial countries affects local and distant ecological sites used as hazardous dumping areas (Figure 34). According to Akpan and Olukanni (2020), Russia generates the highest amount of hazardous waste globally, at almost 140 billion tonnes per annum, with the United States

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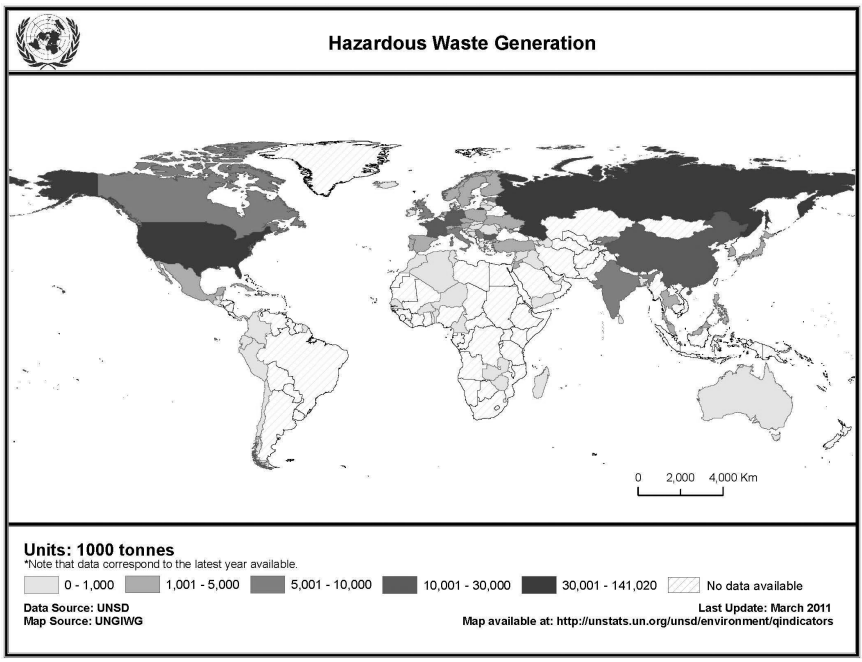


FIGURE 34 Hazardous waste map.
Source: United Nations Statistics Division, 2011 (https://unstats.un.org/unsd/environment/hazardous.htm).

following behind at 37 billion tonnes per annum. According to research by the United Nations Environment Program (UNEP), these authors report that about 400 million tonnes of hazardous waste are generated globally every year. Africa, most notably Nigeria, has become a dumping ground for hazardous waste materials because of the high importation of scrap computers and electronic devices into the country.

Plastic waste has become a commodity sold and traded in a global industry that generates US$ 200 billion per year and thus reduces pressure on rich countries, the primary waste producers. It is usually exported to countries where recycling costs are less expensive, though they are not equipped nor prepared for proper management.

According to European sources,[3] half of the European countries scrutinised have either a too-low reported rate of hazardous waste or underrated figures, and 10 out of 14 member states have insufficient infrastructures to treat their hazardous waste properly. In developing countries, waste management problems differ since most do not have an organised means of controlling solid waste.[4]

Air pollution received the least government spending, even though it is the most lethal force on the planet, killing an estimated 7 million people each year, according to WHO (2020),[5] and causing even more deaths and pathologies than

COVID, the last year for which there are data. What compounds the problem is that living beside dump sites has generated a subculture of survival, generating additional health and educational problems in several countries.

The United Nations declared access to a clean environment a human right. According to the WHO (2021), approximately 13.7 million deaths yearly – 24.3% of the global total – are due to environmental risks such as air pollution and chemical exposure.[6] American exporters continue to ship plastic waste overseas, often to poorer countries, even though most of the world has agreed not to accept it.[7]

The world's estimated 20 million waste pickers are often an informal, invisible workforce relied upon by governments in parts of Latin America (Figure 35),[8] Asia, and across Africa.

The following brief comments provide a limited overview of humans thriving on garbage dumps across several countries.

- The world's second-biggest garbage dump is in Brasilia. It has been growing since the 1950s when city planners failed to factor in proper facilities for trash disposal, and now occupies the equivalent of 250 football fields.[9]
- In Delhi, trash collectors each sort and transport around 10–15 kg of waste daily.[10]

FIGURE 35 Waste pickers sort through garbage in Brazil.
Source: Agencia Brazil.gov

- In Nigeria, the Olusosun landfill is the largest in Africa, a government-run site which receives 2.1 million tonnes of waste per year and is almost 50 football fields wide and 18 m deep. It is 1 of 6 sites taking in general waste from all over Lagos.[11]
- One of Africa's largest dumpsites, Dandora, covers a part of the Kenyan capital, taking up 22 football fields.[12]

According to Dell (2020),[13] per a 2019 update, 225 containers of plastic and 120 million kg of carbon emissions are shipped per day to countries with poor waste management. Additionally, the report states that the amount of US plastic waste in countries with high waste mismanagement may be even higher because the US exports millions of kilograms of plastic waste to countries like Canada and South Korea and re-exports US plastic waste to other countries.

Regarding electronic waste, such as computers, televisions, stereos, and copiers, according to Mihai et al. (2019), at the global level, 8.9 Mt of e-waste is documented to be collected and recycled, which corresponds to 20% of all the e-waste generated in 2016 (44.7 Mt) while 1.7 Mt are thrown into the residual waste in higher-income countries which are susceptible to be incinerated or landfilled (Baldé et al. 2017).

According to a report from the Columbia Climate School (2018),[14] in 2016, the world's population discarded 49 million tonnes of e-waste (equivalent to about 4,500 Eiffel towers). This report estimated that in 2021, that number would grow to more than 57 Mt. This overwhelming electronic surplus is fed by companies' policies, which intentionally update software design and discontinue support for older models, making it cheaper and easier to buy a new product than repair an old one. Meanwhile, the companies continue to profit from steady sales.

Frequently, operators do not wear protective equipment and are unaware they are handling dangerous materials. Despite the resulting health and environmental hazards, many in developing countries earn a living by dismantling, refurbishing, repairing, and reselling used electronic devices. According to the previously mentioned report,[15] Guiyu, China, is often considered the e-waste capital of the world, with 75% of households involved in the recycling business. Informal recycling is also practised in India, Nigeria, Ghana, and the Philippines.

As people grow more affluent, they consume and discard more (Figures 36 and 37); advanced economies make up 16% of the world's population but produce 34% of its waste.

> … a country with a population of 1.4 billion, China produces the most municipal solid waste (over 15%). However, considering in terms of population, the US generates the most waste per person. The United States makes up around 5% of the world's population but produces 12% of the solid waste. It also takes the title of the biggest producer of food waste in the world.
>
> *(Botham 2022)*[16]

FIGURE 36 Major waste generators.
Source: World Bank, Statista (https://www.statista.com/chart/18732/waste-generated-country/).

According to a *New York Times* report by Hiroko Tabuchi and Michael Corkery,[17] US exporters continue shipping plastic waste overseas, often to poorer countries, even though most of the world has agreed not to accept it. Waste product generation is reflected in Figures 38 and 39, according to the International Monetary Fund and the World Bank, respectively.

> The US Census Bureau recently published complete 2018 export data for shipments of plastic waste (officially called "waste, paring and scrap") generated in the US and sent to other countries. As shown in Figure 1, 78% (0.83 million metric tonnes) of the 2018 US plastic waste exports were sent to countries with waste "mismanagement rates" greater than 5%. The actual amount of US plastic waste that ends in countries with poor waste management may be even higher than 78% since countries like Canada and South Korea may re-export US plastic waste. The data also indicates that the US continued to export about as much plastic waste to countries with poor waste management as we recycle domestically.[18]

Besides waste generation, a critical issue is represented by its disposal, as described above (dumping sites). According to *Statista*, less than 20% of waste is recycled yearly, with huge quantities still sent to landfill sites. Waste is often disposed of

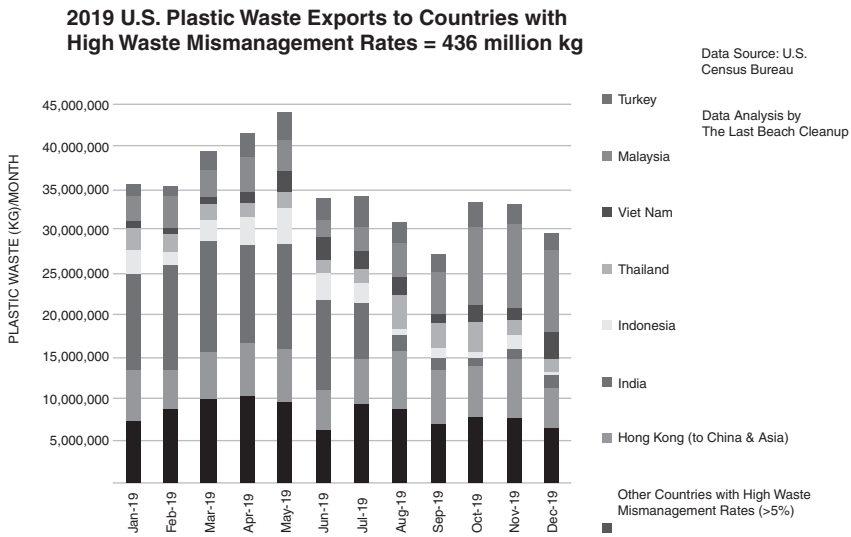


FIGURE 37 2019 US plastic waste exports to countries with high waste mismanagement rates.

Source: US Census Bureau (https://usatrade.census.gov/).

at hazardous open dump sites, especially in developing nations. Several factors add to this problem, such as an increased world population, a consumerist culture, access to safe waste disposal procedures, cultural profiles, and non-biodegradable waste products. A concerning impact on human health and the environment is mounting due to different rates of change of these factors.

*

According to the Worldwatch Institute (2000), if, as most marine biologists believe, the oceans cannot sustain an annual catch of more than 95 million tonnes, the catch per person will decline steadily in the decades ahead as the world population expands. In such a scenario, land-based food sources will need to increase.[19]

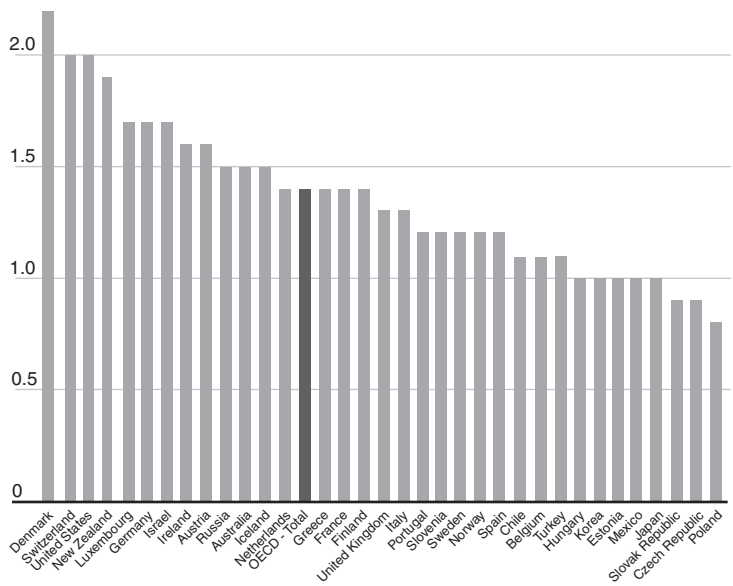
The world produces around 200 million tonnes of fish and seafood every year. This comes from a combination of wild fish caught and fish farming. The rapid growth of aquaculture over the last few decades means we now produce more seafood from fish farms than from fisheries.

Reportedly, the global wild fish catch has not increased since the early 1990s and has remained relatively constant at around 90–95 million tonnes per year. However, a report states that the new estimate, released in Nature Communications, puts the annual global catch at roughly 109 million Mt. It is some 30% higher than the 77 million officially reported in 2010 by more than 200 countries

What a Waste

The average waste generated per person among OECD countries in 2014 was 1.4 kg every day, which is just over 3 lbs.

(Solid Waste Generation: KG/Person/Day)



Sources: OECD Environmental Statistics

INTERNATIONAL MONETARY FUND

FIGURE 38 Average waste generated per person among OECD countries in 2014. *Source*: IMF (https://www.imf.org/wp-content/uploads/2020/01/Chart-1-waste-blog.png).

and territories.[20] On the other hand, fish farming is multiplying; from 1960 to 2015, it increased 50-fold to over 100 million per year.[21]

Since 2001, the World Trade Organization has unsuccessfully advocated for the abolition of harmful subsidies in the fishing industry. Countries drastically underreport the number of fish caught worldwide. A study shows that if nothing changes, we will run out of seafood in 2048.[22]

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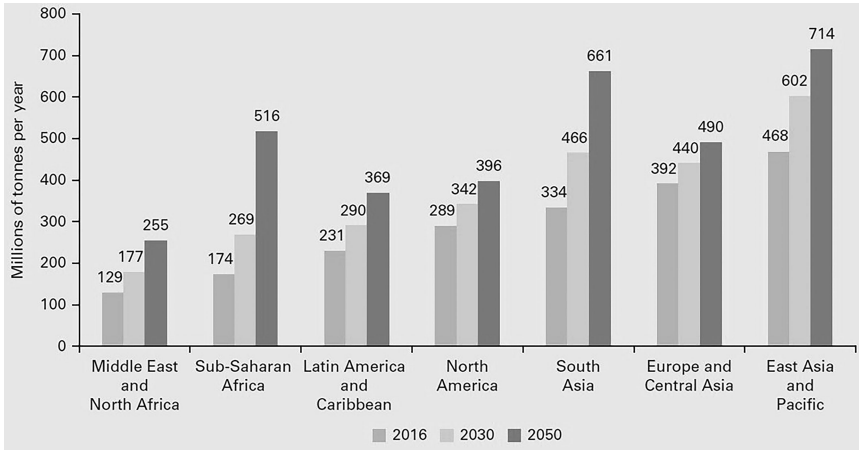

FIGURE 39 According to the World Bank, there is a trend of increasing waste generation across countries and regions (https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html#:~:text=Globally%2C%20most%20waste%20is%20currently,with%20landfill%20gas%20collection%20systems).

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11

WEALTH INEQUALITIES AND SOCIAL DOMINANCE

The *Gini index* represents a measure of the extent to which the distribution of income (or, in some cases, consumption spending) among individuals or households within an economy departs from a perfectly equal distribution. The Lorenz curve shows the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest person or household. According to *www.indexmundi*, the Gini index measures the area between the Lorenz curve (Figure 21) and a hypothetical absolute equity line, expressed as a percentage of the maximum area below the line. Thus, a Gini index of 0 represents perfect equality, while an index of 100 represents perfect inequality.

Besides other statistical procedures, it provides an additional comparative view of countries' inequalities. In Table 12, selected countries have been included for comparison purposes.

As Kerhoas et al. (2014) mentioned, in gregarious communities with a hierarchical structure, different forms of leadership decide the survival and welfare probability of its constituents.

It becomes clear that the world represents a distorted, unequal condition regarding national and international wealth distribution. This implies profound differences in citizens among developmental and living domains, further affected by political and corporative involvement. According to the *societal poverty line*, the societal poverty line (SPL), which increases with a country's level of income, leads to the conclusion that 2 billion people are still poor (2017) by this definition (Reversals of Fortune, report from the World Bank Group 2020).

Poverty measurements vary worldwide, for which a *national or societal poverty line* (SPL) has been proposed. It is typically a monetary threshold below which a person's minimum basic needs cannot be met, considering the country's economic and social circumstances. Poverty lines not only vary widely by country,

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TABLE 12 Comparative *Gini index* of selected countries (translated).

Position	*Country*	*Value*	*Year*
1	South Africa	63.00	2014
2	Namibia	59.10	2015
3	Suriname	57.90	1999
4	Zambia	57.10	2015
5	Central African Republic	56.20	2008
6	Swaziland	54.60	2016
7	Colombia	54.20	2020
8	Mozambique	54.00	2014
9	Botswana	53.30	2015
10	Belize	53.30	1999
11	Angola	51.30	2018
12	Saint Lucía	51.20	2016
13	Zimbabwe	50.30	2019
14	Panama	49.80	2019
15	Costa Rica	49.30	2020
16	Congo Republic	48.90	2011
16	Brazil	48.90	2020
134	Hungary	30.00	2019
135	Guinea	29.60	2018
135	Pakistan	29.60	2018
137	Iraq	29.50	2012
138	Sweden	29.30	2019
139	Netherlands	29.20	2019
140	Kyrgyzstan	29.00	2020
141	Croatia	28.90	2019
142	Kiribati	27.80	2019
142	Kazakhstan	27.80	2018
144	Finland	27.70	2019
144	Denmark	27.70	2019
144	Norway	27.70	2019
147	Algeria	27.60	2011
148	Belgium	27.20	2019
149	Azerbaijan	26.60	2005
150	Iceland	26.10	2017
151	United Arab Emirates	26.00	2018
151	Moldova	26.00	2019
153	Ukraine	25.60	2020
154	Czech Republic	25.30	2019
155	Armenia	25.20	2020
156	Belarus	24.40	2020
156	Slovenia	24.40	2019
158	Slovakia	23.20	2019

Note: https://www.indexmundi.com/es/datos/indicadores/SI.POV.GINI/rankings (translated).

but richer countries typically have higher poverty lines than poorer ones. The global poverty line must be periodically updated to reflect these changes. Since 2015, the last update, it has used the US$ 1.90 as the global line. As of fall 2022, the new global line is US$ 2.15 using 2017 prices. Under traditional poverty criteria, anyone living on less than US$ 2.15 daily falls under extreme poverty. With this criterion, just under 700 million people were in this condition in 2017.

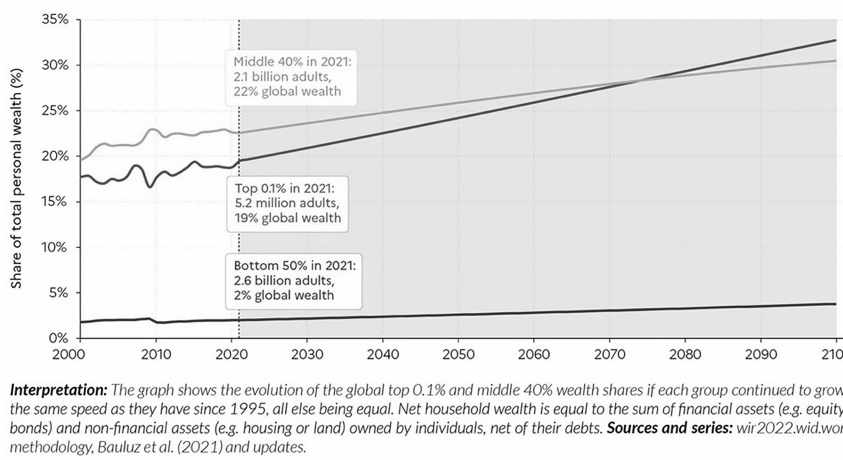
Recent World Bank estimates under this criterion have stated that 9.2% of the world's population lives in extreme poverty and that an additional 119 and 124 million people have fallen into poverty due to the COVID-19 pandemic. However, these estimates may be significantly understating the scale of global poverty.[1]

The national poverty line is typically a monetary threshold below which a person's minimum basic needs cannot be met, considering each country's economic and social circumstances. Poverty lines vary widely and are often revised as countries develop; richer countries typically have higher poverty lines than poorer ones.

The societal poverty line, which increases with a country's income level, suggests that 2 billion people are still poor by this definition. A projected composite for 2000–2100 is shown in Figure 40.

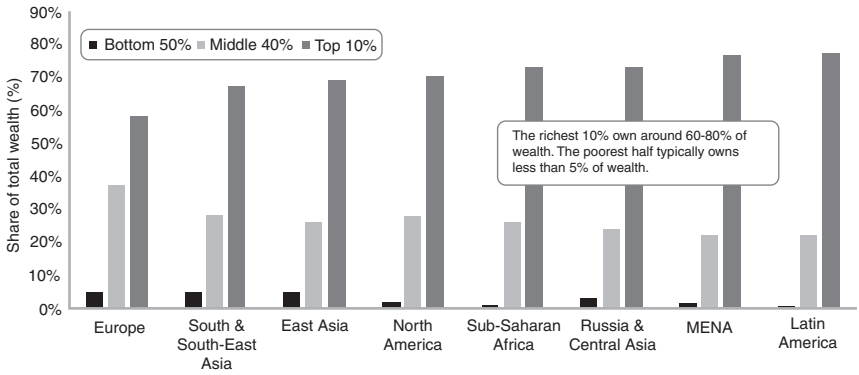
Figures 40 and 41 show that the top 10% of the global population owns 60%–70% of total wealth, while the bottom 50% owns less than 5%.

These revealing averages disclose wide disparities between and within countries. The wealthiest 10% of the global population currently owns 52% of global income, whereas the poorest half earns 8.5%. Global wealth inequalities are even more pronounced than income inequalities. The poorest half of the global



Interpretation: *The graph shows the evolution of the global top 0.1% and middle 40% wealth shares if each group continued to grow at the same speed as they have since 1995, all else being equal. Net household wealth is equal to the sum of financial assets (e.g. equity or bonds) and non-financial assets (e.g. housing or land) owned by individuals, net of their debts.* ***Sources and series:*** *wir2022.wid.world/methodology, Bauluz et al. (2021) and updates.*

FIGURE 40 Projections of the top 0.1%, middle 40%, and bottom 50% wealth shares for 2000–2100 (https://wir2022.wid.world/www-site/uploads/2021/10/CH4-F4.6-2.jpg).



Interpretation: *The top 10% in Latin America captures 77% of total household wealth, compared with 1% captured by the bottom 50% Net household wealth is equal to the sum of financial assets (e.g. equity or bonds) and non-financial assets (e.g. housing or land) owned by Individuals, net of their debts.* ***Sources and series:*** *wir2022.wid.world/methodology.*

FIGURE 41 Extreme concentration of capital shows wealth inequality across the world for 2021 (https://wir2022.wid.world/chapter-1/).

population barely owns any wealth, possessing just 2% of the total. In contrast, the wealthiest 10% owns 76% of all wealth.

Multi-dimensional poverty captures deprivations in education and access to basic infrastructure in addition to income or consumption at the $1.90 international poverty line. It represents a means to capture the complexity and persistence of poverty by highlighting additional deprivations experienced by the poor in addition to the extreme poverty threshold of $1.90. The IPL is now (2022) derived as the median of the national poverty lines of 28 of the world's poorest countries, expressed in 2017 PPPs.

The *Poverty and Shared Prosperity 2020 Report* (Castaneda Aguilar 2020) shows that over a third of those experiencing multi-dimensional poverty are not captured by the monetary headcount ratio, in line with prior editions of the report (World Bank 2018). At a global level, the share of the poor is 50% higher when education and basic infrastructure are added alongside monetary poverty – from 11.5% living below US$ 1.90 per day to 17.5% deprived in at least one of the three dimensions.

Table 13 registers individuals in households deprived of indicators, as shown.

The spread of multi-dimensional poverty can be observed in the final column. Individuals in households deprived in each indicator, 150 economics (for 2009 and later) Date: April 30, 2022.

Current concern on world economic trends is clearly expressed in the Foreword of the World Inequality Report (Chancel et al. 2022),

> We now know that the Reagan-Thatcher revolution was the starting point of a dizzying rise in inequality within countries that continues to this day. When state control was (successfully) loosened in countries like China and

TABLE 13 Individuals in households deprived in each indicator (2022)

Economy	*Survey year*	*Survey name*	*Welfare type*	*Monetary (%)*	*Educational attainment (%)*	*Educational enrolment (%)*	*Electricity (%)*	*Sanitation (%)*	*Drinking water (%)*	*Multi-national poverty headcount ratio (%)*
Albania	2018	HBS	c	0.1	0.2	-	0.1	6.6	9.6	0.4
Angola	2018	IDREA	c	49.9	29.8	27.4	52.6	53.6	32.1	58.0
Argentina	2020	EPHC-S2	i	1.6	1.4	0.7	0.0	0.8	0.1	1.6
Armenia	2020	ILCS	c	0.4	0.1	1.9	0.0	0.8	1.6	0.4
Australia	2018	SIH-LIS	I	0.5	1.7	-	0.0	0.0	-	2.2
Austria	2020	EU-SILC	i	0.7	0.0	-	0.0	0.8	0.7	0.7
Bangladesh	2016	HIES	c	14.3	22.0	8.4	23.6	54.5	2.8	21.2
Belarus	2019	HHS	c	0.0	0.0	-	-	4.6	3.3	3.2
Belgium	2020	EU-SILC	i	0.2	0.6	-	0.0	0.7	0.4	0.8
Benin	2018	EHCVM	c	19.2	50.2	31.5	54.3	80.0	22.1	53.1
Bhutan	2017	BLSS	c	1.5	40.8	4.1	1.9	14.3	0.4	3.9
Bolivia	2020	EH	i	4.4	14.1	2.1	4.4	17.9	6.6	7.8
Botswana	2015	BMTHS	c	14.1	8.2	4.2	35.5	52.0	3.7	20.0
Brazil	2019	PNADC-EI	i	4.9	15.0	0.4	0.2	34.3	1.8	5.6
Bulgaria	2020	EU-SILC	i	0.9	0.6	-	0.0	13.2	7.4	1.4
Burkina Faso	2018	EHCVM	c	33.7	56.4	50.9	47.2	69.6	19.7	61.4
Cabo Verde	2015	IDRF	c	3.4	11.7	2.7	9.9	30.2	11.1	6.5
Chad	2018	EHCVM	c	33.2	69.0	34.9	90.0	87.0	34.8	79.4
Chile	2020	CASSEN	i	0.7	3.4	3.3	-	1.4	0.8	1.0
Colombia	2020	GEIH	i	6.6	5.4	2.9	1.5	8.8	3.0	7.1
Costa Rica	2020	ENAHO	i	2.1	3.9	0.5	0.1	1.4	0.1	2.1

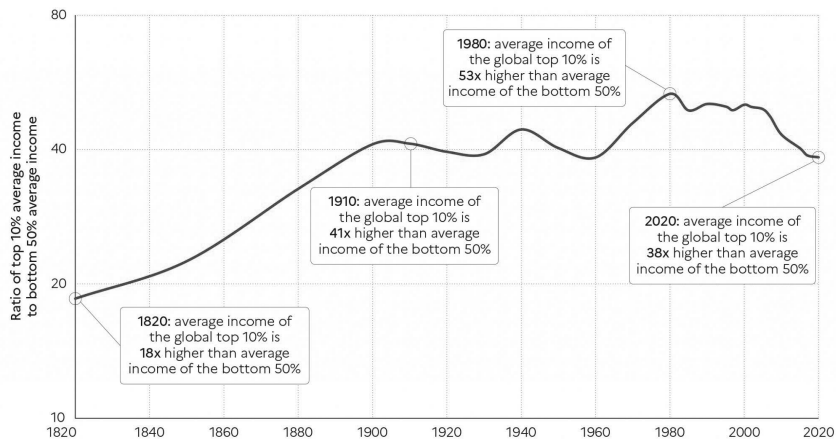
Note: https://thedocs.worldbank.org.

India to allow private sector-led growth, the same ideology got trotted out to justify not worrying about inequality, with the consequence that India is now among the most unequal countries in the world (based on this report) and China risks getting there soon.

The growth in global inequality is also represented in Figure 42, showing that in 1820, the average income of the global top 10% was 18 times higher than the average income of the bottom 50%, while in 2020, it was 38 times higher.

It is stressed at the outset that addressing the challenges of the 21st century is not feasible without significant redistribution of income and wealth inequalities and its impact on education and cognitive development.

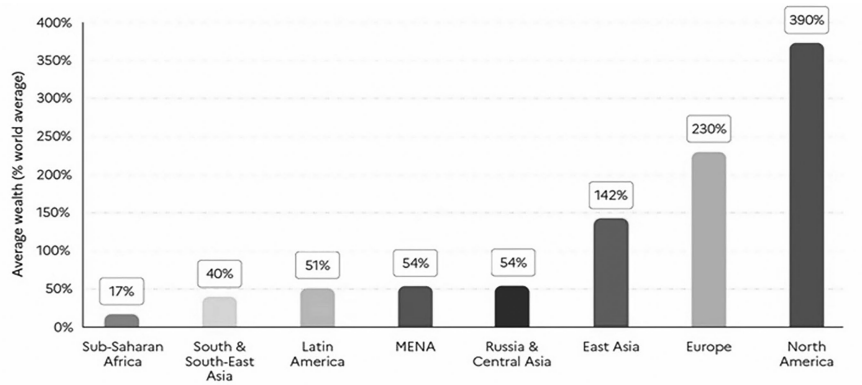
As shown in Figure 43, there is a consistent relative distribution of wealth across world regions disclosing its distribution in terms of per cent of the share of total wealth. The wealth inequality worldwide, depicted as the ratio between the top 10% average income and the bottom 50%, shows a relatively consistent oscillation since approximately 1910. **It is striking that the wealth of the top 10% broadly represents 60%–80% of the global wealth in all regions. It reveals the persistence of financial elite systems on all continents, irrespective of the political institutions the societies have opted for and their level of economic development.** North America, the world's wealthiest region, is also one of the most unequal regarding wealth ownership.[2]



Interpretation: *Global inequality, as measured by the ratio T10/B50 between the average income of the top 10% and the average income of the bottom 50%, more than doubled between between 1820 and 1910, from less than 20 to about 40, and stabilized around 40 between 1910 and 2020. It is too early to say whether the decline in global inequality observed since 2008 will continue. Income is measured per capita after pension and unemployement insurance transfers and before income and wealth taxes.* ***Sources and series:*** *wir2022.wid.world/lmethodology and Chancel and Piketty (2021).*

FIGURE 42 Global income inequality 1820–2020.

Sources and series: wir 2022.wid world/methodology and Chancel and Piketty (2021) (https://wir2022.wid.world/chapter-1/).



Interpretation: *In 2021, the average wealth of North America is 390% of world average wealth (at Purchasing Power Parity). Net household wealth is equal to the sum of financial assets (e.g. equity or bonds) and non-financial assets (e.g. housing or land) owned by individuals, net of their debts.* ***Sources and series:*** *wir2022.wid.world/methodology.*

FIGURE 43 Average wealth across world regions (2021) (https://wir2022.wid.world/category/chapter-1/).

The projections made for the future regarding the comparative distribution of wealth shares are most unsettling should trends remain as present (Figure 43).

Should the several indicators of the worldwide human condition and resources be combined in comparative equations involving various components such as poverty rate, wealth distribution, education gap, research and development, military strength, information access, and internet access, the result would show a sizeable gap in health, educational, welfare, and cognitive development among individuals and communities (as well as military power). It would tend to suggest that radical changes ought to be made, or human civilisation horizon would irremediably keep transiting toward a diverse, conflicting path among its social and institutional constituents.

As a general conclusion, regardless of the level at which inequality is exercised, the impunity of power, egocentric and greed or class irrationality, and the corporate objective in the exercise of financial (public, private, and religious) or political power are one-way paths towards social inequity, confrontation, loss of creativity, and, eventually, the functional demeaning of human communities.

***

Notes

1 https://www.worldbank.org/en/topic/measuringpoverty; https://blogs.worldbank.org/opendata/updated-estimates-impact-covid-19-global-poverty-lookingback- 2020-and-outlook-2021?cid=pov_tt_poverty_en_ext.
2 https://wir2022.wid.world/chapter-1/.

12

DR JEKYLL AND MR HYDE EMBEDDED IN OUR HUMAN HISTORY

As stated in a *Nature* editorial (2016), the human lineage diverged from that of chimpanzees some 5–7 million years ago. If we could mark the remains of all our ancestors from that point on, the world would be one enormous cemetery.

During millennia, species of the natural kingdom underwent additions and mutations involving the sequence of DNA pairs of bases and regulatory genes, depending on the reproductive success indices of different species and the environmental conditions of their ecological niches, as well as suggested interspecies early genetic exchanges among *Homo* (see before). These changes and those of environmental origin continuously reformulate the interactions that define the actual phenotype. According to Kaessmann and Paabo (2002), our genome consists of about 3 billion nucleotides that have been passed down to us; ongoing gene mutations and silencing affect these nucleotides in every generation and accumulate in distinct ways. Thus, slightly different versions of the ancestral genome are received by subsequent generations and expressed depending on actual cultural circumstances. However, ingrained in ancient core neural circuits (mostly basal brain) survive our basal behavioural set of responses (fight, flight) and drives (reproductive, territorial, survival, feeding) that condition survival probabilities and social interactions.

According to Gagneux and Varki (2001), *Homo sapiens* would share a common ancestor 5–6 million years ago with the chimpanzee and bonobo, 7–8 million years ago with the gorilla, and 12–13 million years ago with the orangutan. Thus, our phylogenetic human ancestry carries genetic remains, behavioural imprints of the long-term primate history, and unaccountable reproductive exchanges exerted during millions of years in ancient Homo species.

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As summarised by Mirazon Lahr (2016b), *Homo sapiens'* evolution would have undergone five periods:

- Its origin some 240–200 thousand years ago
- The first expansions (within Africa), some 130–100 thousand years ago
- Initial dispersion (out of Africa), some 70–50 thousand years ago
- Local configuration of diversity, some 45–25 thousand years ago
- Significant extinction of hunter-gatherer groups and expansion of farmers and subsequent cities (the Holocene filter) some 15 thousand years ago

This view should be complemented by the comments made by Mounier and Lahr (2019). They state that based on the available fossils, *H. sapiens* appears to have originated from the coalescence of South and, possibly, East-African source populations, while North-African fossils may represent a population which introgressed into Neandertals during the Late Middle Pleistocene.

In terms of behavioural profiles, as stated in Colombo (2019), based on the behaviours of both species (*Pan troglodytes* and *Pan paniscus*), Boehm (2012a, b) sustains that humans would keep both behavioural alternatives, a potential behavioural bipolarity with uneven prevalence distribution among individual characters and social organisations. According to Boehm (2012a, b), this hypothetical behavioural duality could be linked to the configuration of the human genome and the subsequent neurobiological development, besides genetic exchanges among early *Homo* lineages. It would then be reasonable to expect those basic tendencies to predominate in different groups of individuals, in addition to cultural conditioning. If so, the expression of the behavioural phenotype would depend on the ancestral genomic configuration and behavioural dominance in interaction with socio-cultural, ecological, and sociobiological conditions.

This profile view of human phenotypes based on ancient primate genomes conditioned by socio-cultural and environmental conditions reflects the concept of dominance on a different dimension than social construction: a prevalence of genotypes. However, it provides an evolutive ground where the presence of this potential bivalent behavioural trend would have evolved. This poses a dual context in which it may be expressed as two predominant phenotypic populations or as an individually internalised behavioural *bipolarity*. In both cases, its expression will depend on the interaction with cultural developmental and socioecological conditions.

Beyond taxonomic classification, the issue remains to explore genomic persistence embedded in many *hominids* and *hominin* lineages. This would allow a reconstruction of our inherited fundamental condition, camouflaged behind our sophisticated and regionally diverse cultural complexity. In this sense, Smith (2012) provides a statement that significantly impacts our self-conscience of our cultural construction, stating that human nature is violent to the extreme judging from these examples. This is precisely what Richard Wrangham's hypothesis

suggests that we have inherited a dominance drive from our primate ancestors. Furthermore, according to Preston (2013), even complex human behaviours reflect ancient mammalian neural systems that evolved to solve critical problems in adaptive ways, with far-reaching consequences for even our most venerated human traits.

*

Our species' structural, functional, and social development derived from accelerated progress in cognition, ecological exploitation, expansion of cognitive limits, increased hierarchical structures, and the social-education gap among social strata. Within the natural environment – which we abandoned to reformulate conditions for new interactions with the ecological system – species growth is balanced among available feeding resources and prey-predator interactions. Whether of solitary or gregarious social habits, animals and vegetables (see Baluska and Mancuso 2020) show territorial behaviours towards conspecifics and prey on them or reject those that compete with feeding resources. Territoriality and prevalence are a universal must in survival behaviours within the natural kingdom. The point is whether we humans should sustain these ancient drives, for *Homo sapiens* still carries such a *backpack,* and its culturally transformed or hidden expression takes place as *dominance* either spontaneously or under pressing circumstances or transformed into virtual (ideological) domains. To this should be added its coevolution with the continuous development of sophisticated material culture and progressively sophisticated weaponry, which interactively evolves our collective mind and virtual constructions.

The *Human Kingdom* is characterised by overexploitation of natural resources, air and water pollution, extraterrestrial quests powered by strategical positioning and mineral exploitation, material and beliefs warmongers, cognitive and technological developments aimed at relative power increase, and generation of populations below mean purchase and living conditions and educational standards. Creative human power has enriched human culture, yet it is accessible to a limited percentage of the world population that proposes control and develops material and collective emotional vectors that tend to mould our human community's behavioural profile and expectations. It largely involves financial power and corporative groups continuously attempting to mould or influence political and developmental conditions and consumer profiles adjusted to their profit goals.

Additionally, deviant behaviours emerged from our comparatively privileged cognitive capabilities overpowered by bursts of unleashed animal drives expressed under political or religious coverups to extremes of physical and emotional cruelty, as documented in our human history. Wars, torture, and famine emerged from our species' sovereign dominance. The dominant species shows the ominous side as if it were enacting a non-fictional story to the likes of *Dr Jekyll and Mr Hyde*. Cruelty – a human behavioural creation compared to

prey and predator interactions – applies calculated suffering procedures to obtain revenge, punishment, or material and power gains. It represents predator-deviant behaviour expressed by individuals and institutions from different ideological/religious sources and social strata throughout history.

Data from the State of the World on poverty lines disclose a deep gap among and within regions and countries, as shown in the World Bank Report 2020, from which excerpts will be included later.

The metaphoric figure of our species as *Dr Jekyll and Mr Hyde,* mentioned in this Chapter title, is represented on the constructive side by its creative potential, as expressed by the artistic and instrumental creations of Leonardo da Vinci, Miguel Angel Buonarotti, Henri Matisse, Henri de Toulouse-Lautrec, Rembrandt Harmenszoon van Rijn, Claude Monet, Vincent van Gogh, Diego Velazquez, Pierre-Auguste Renoir, and so many others, as well as those of Jorge Luis Borges, Jules Verne, Ernst Hemingway, Leon Felipe, Pablo Neruda, Rafael Alberti, León Tolstói, Fédor Dostoievski, and so many others, and those of Eduardo Chillida, Henry Moore, August Rodin, Il Giotto, Alberto Giacometti, and so many others, and philosophical and scientific thinkers as Socrates, Pythagoras, Galileo Galilei, Copernicus, Dmitri Mendeleev, Charles Darwin, Santiago Ramon y Cajal, Pasteur, Pierre and Marie Curie, Niels Bohr, Albert Einstein, and so many others, and personal life-risk commitment examples of Spartacus, Mahatma Ghandi, Nelson Mandela, Martin Luther King, and so many other equal rights leaders throughout human history, all of which – plus a myriad of other creatives – are examples of our species' creative power. These examples open a hopeful window for the future of our species, obscured by the actions or menaces stemming from political, corporate, and religious organisations with the power to exercise undue, corporative-biased leadership.

Unfortunately, examples of creative proposals influence or reach a comparative minority of the world population, another sign of the stratified population's access to quality of life. Access to enriched cultural contexts for commoners and labour forces lay on the distant side of the cultural gap. This fractured cultural reality and lack of exposure to the best expressions of our species goes in hand with the lack of education and of geopolitical bridges in cultural development and horizons of global progress. Additionally, true, permanent values of our human species are often distorted by the media masses and coverups.

On the opposite side, human nature's cognitive and Machiavellian potential distorted the behavioural expression of prey-predator interactions and developed strategies to hide persistent ancient animal drives behind socio-cultural profiles. These were combined to produce a vast array of cruel behavioural profiles, as partially shown below in illustrations, and a deepening gap in social and knowledge development among the world population. Within non-human animal species, physical competition and predatory killing – within the social group or with foreign competitors – result from a natural need to secure survival resources and social (reproductive) position, respectively. In such context, our competitive and

cooperative warmonger profiles emerged as an evolutive, cultural-fanatism and enhanced derived basic animal behaviours moulded by parochial (territorial or cultural) or religious means. In such competitive grounds, within an individual or social group domain, cruelty represents a socio-pathological behaviour applied to impose strategic power/prevalence or a behaviour aimed to satisfy individual or group psychological deviant tendencies.

According to Hermann (2017), territorial disputes and agonistic behaviour are commonly expressed in dominance establishment. These behavioural trends have their institutional counterpart in public policies and political and corporative constructions.

*

Empowerment of Hierarchies and Dominance Reveal Hidden Ancestral Drives That Derived into Purposeful Cruel Behaviours of Nature and Practices Unknown in the Animal Kingdom

As stated by Bicknell et al. (2022) on the evolutionary impact of the Cambrian period, it represents the rapid emergence of complex marine ecosystems and the propagation of predator-prey interactions within these systems, which resulted in the promotion of biomineralised exoskeletons and shells, and the evolution of the first durophagous (shell-crushing) predators.

Indications that suggest early expression of dominance and elimination of competitors of the same species probably due to nutritional or territorial drives have been reported for an inhabitant of the Cambrian[1] seafloors, suggesting that basic survival drives emerged early to stay across the successive evolutive species of the natural kingdom. Furthermore, according to these sources, new research has revealed that these armoured predators (now extinct trilobites in the Cambrian seafloor) not only hunted smaller and weaker animals for food but would occasionally take bites out of their trilobite comrades of the same species. This finding would represent the earliest evidence of cannibalism in the fossil record.

Though cannibalism in the natural kingdom would be density-dependent and have consequences for regulated population dynamics (Fox 1975; Rosenheim and Schreiber 2022), among humans is rare, and its motivations imply a socio-behavioural debatable issue, as posed by Oostland and Brecht (2020).

As schematically profiled in previous chapters and the following pages, an unsettling query emerges at comparing those behaviours with the diverse forms of human dominance, slavery, torture, and extermination, whether it represents an evolutive behavioural profile replacement exerting "social cannibalism."

The procedures exerted on prisoners by religious and ideological fundamentalists and pseudo-democratic governments have shown new evidence of torture. Examples with different degrees of perverse imagination abound in recent events and the history of *human civilisation*, whether applied by religious

or non-religious institutions or fundamentalisms, mobs, conquerors, or individuals invested with power, or because of individual pathological behaviours. They all seem to have in common to have gone beyond an expected humane behaviour and acquired an individual or collective *insane* condition; the release of behaviours extraneous to animal survival needs, as it would happen in the natural kingdom. It is as if, under the proper context, behavioural drives emerged that unlocked a specific human expression of *twisted* predatory behaviour. All those expressions have cracked our most honourable and respectable concept of human nature.

However, there are other forms of distorting the human mind and body, which are exerted subtly but with a more significant effect. Worse yet, these have succeeded to last to present times due to various degrees of poverty and social marginality. It consists in condemning people to degraded living conditions, a loss of identity, and to lose the opportunity to participate in a higher standard of life. These convert a potential creative citizen into a marginal being fighting for their basic survival needs, often falling into self-destructive or antisocial behaviours. This chronic condition conspires against full recovery; in family settings, they generate a semi-stationary handicapped condition for their descendants.

*

Dominance, a Behaviour Based on Physical and Virtual Domains. Did Human Behaviour Cease from Predatory Activity?

> We demean, enslave, and exterminate others.
>
> *(Smith 2012)*

> "The massacre site from Potočani (6,200-year-old; east Croatia) is not the first found from European prehistory…" "The only thing that is abundantly clear is that this fundamentally dark human behaviour has persisted for millennia. Mass killings have taken place all over the world for at least 13,000 years."[2]

Our ancestral animal condition and our incomplete, long, interweaved origin impose behavioural profiles and trends in continuous biosocial interaction. Our cultural construction acts over basic biological demands and ancestral animal behavioural drives. Besides our introspection and value judgement, the former conditions our behaviour and become most manifest at times of crisis or menace when animal drives are expressed in humans under the coverup of a cultural disguise (rules, beliefs, ideology).

Regretfully, in human history, including modern times, examples abound of forms of individual and collective or institutionalised deviant behaviours expressed as torture – absent in other animal species – and diverse cruel strategies

applied to individual or massive human elimination as in the past modern religious fanaticism, or politically dominance expressions.

> Scenes depicting torture and corporal punishment can be found on ancient Mesopotamian and Egyptian monuments. The first records of the legal application of torture to prove guilt or innocence were found in the Sumerian Code of Ur-Nammu (ca 21st century BC) and the Babylonian Code of Hammurabi (ca 18th century BC) which in the evidentiary procedure employed the so-called 'divine judgement' of the water-ordeal. Both Codes were founded on the theocratic idea of law that invokes divine authority and interprets the laws as the will of the gods, which all people have to obey.
>
> The records of trials conducted throughout Europe in the 16th and the 17th century testify to the numerous tragic verdicts reached on the basis of confessions extorted by excruciating methods of torture. Many of those trials ended with capital punishment. The Age of Enlightenment in the 18th century brought changes to all processes of society, including legal science.[3]

Einolf (2007) supports the concept that an increase in state monitoring of subjects has caused a tremendous increase in the number of citizens tortured on suspicion of treason. This offset the decrease in torture due to the growth of democracy in the 20th century when torture was as common or more so than in the 19th century.

As mentioned in Colombo (2021a), all cases of human abuse and torture have in common to have gone beyond the expected humane behaviour and acquired an individual or collective *insane* condition; the release of behaviours even extraneous to animal survival needs in the natural kingdom. As if under the proper context would emerge behavioural drives that unlock a specific human expression of *twisted* predatory behaviour. All those expressions have cracked our most honourable, respectable concept of human nature.

Rowland (2008) details the following regarding an excerpt dated February 17, 1600:

> …it was a violent age, and the reigning pope, Clement VIII, had approved some horrific executions…. like the burning of a Scottish heretic in 1595… as it was reported to the duke Urbino by the same agent who would report on (Giordano) Bruno: '*…he was made to sit on an iron chair next to the fire, which has been already lit…as soon as he has already mounted the iron chair, he threw himself with a great hurry into the burning flames…'*

Rowland (2008) further notes regarding the final fate of Giordano Bruno under the Inquisition:

> The records for that morning –February 17, 1600–report; '*After offering Bruno the traditional breakfast…the jailers stopped his tongue with a*

> *leather gag and set him on his mule…was led to the Campo de Fiori, and there, stripped naked and tied to a stake, he was burned alive…'.*

Torture, its imposed sacrificial cults, and related conducts are human creations expressing sociopathic dominance behaviours to obtain some material profit or emotional – pathological – gain or reward. At what stage in *Homo* evolution did generating pain to third parties purposedly become part of accepted social behaviours to impose dominance and attempt to control dissents?

The following short set of figures (Figures 44–54) crudely describes tortuous instrumental inventions and behaviours applied to humans, whether described in artworks or actual photographs. These were used to obtain revenge, force confessions or pursue power goals, or fight/eliminate those that menace embracement of material, social, ideological, or political advantages, religious beliefs (as was the case of Giordano Bruno's execution), or hierarchies. These images – for which the author asks to be excused for including them but considered a visual reinforcement of existing obscure human drives beyond any literary mention – are pale examples of the cruel extremes the human species can reach, not only individually but also as institutionally sponsored acts. Examples of this are also exemplified in the massacres of St. Bartholomew's Day,[4] the Spanish Civil War,[5] and the Tlatelolco Massacre in Mexico (1968).[6] See the Appendix for a partial, annotated listing of wars and massacres.

Even religious institutions and movements were involved in these activities. Expressing these altered behaviours is a component of *the evolutionary trap* in which our species has fallen, anchored to our brain/mental capacities and built-in prejudices and fanaticism. It is worth adding that throughout the history of civilisation, the variety of torture devices and procedures challenges the limits of most perverse imaginations and exceeds the aim of this book. These actions, as war, would represent the socio-pathological expression of ancient animal drives (dominance, prevalence) pretentiously hidden under cover of ideological and moral values, feeding corporate predators on the military and remains of the opponents. The inclusion of the following images has the sole purpose of denuding what the written comments may not wholly express regarding the nature of our basic, ancestral species' dilemma embodied in national, racial, ideological or religious fanaticism, leading to warmongers and torturers. This is an expression of the dark side of our species-twisted minds that invented and applied sinister instruments to execute penalties and apply self-accredited, supposedly dominance rights. Photographs with art-image representations complete this short gallery on the human horrors populating one side of our *evolutionary trap.* They are metaphorically summarised in the figure of *Dr Jekyll and Mr Hyde.* It is a minimal description of what represents one significant profile of human behaviour expressed throughout the world history of our civilisation under different cultures and geographical locations that would build a gallery of horrors and shake our pretentious humanity with cliches like "*with God on our side.*"

The burning question that emerges is what it takes to tune the human cord of our *Homo sapiens* species to vibrate so intensely as to cancel the horrors it can construct, regardless of ideological, political, religious, racial, or corporative standing.

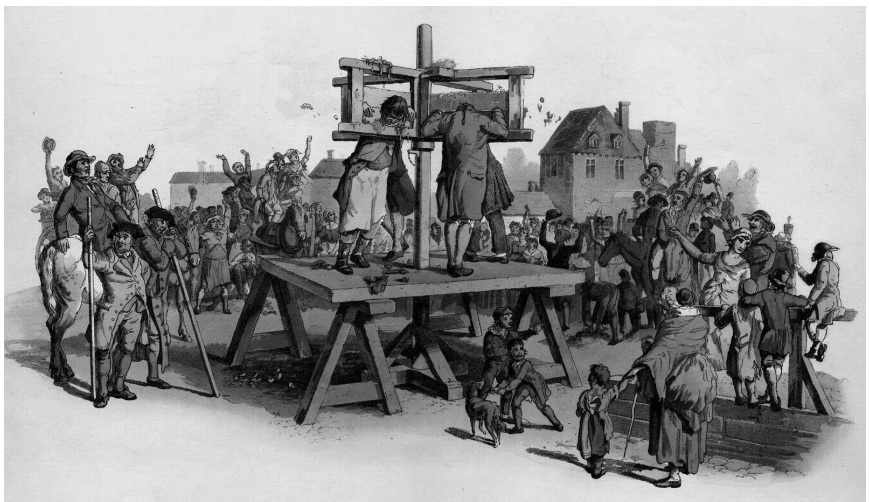

FIGURE 44 Criminals in a pillory.
Source: Britannica. "Four criminals in a pillory, an instrument of corporal punishment that secured the head and hands in an uncomfortable position and, because it was used in public, enabled both verbal and physical abuse by other citizens, *c.* 1805." (https://cdn.britannica.com/86/131386-050-1F480283/instrument-criminals-head-pillory-corporal-punishment-position-1805.jpg)

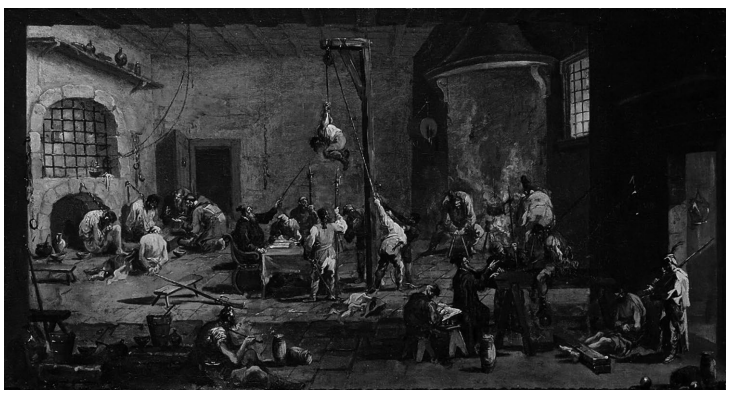

FIGURE 45 I*nterrogations in jail*. Alessandro Magnasco (1667–1749) (https://es.m.wikipedia.org/wiki/Archivo:Alessandro_Magnasco_-_Interrogations_in_Jail_-_WGA13849.jpg).

FIGURE 46 A Brazilian overseer is whipping an enslaved person in the colonial era (https://commons.wikimedia.org/wiki/File:024debret.jpg).

FIGURES 47 (**A, B**) Examples of torture devices. (a) "stretching bed"; (b) "confessional armchair." European Museum of Torture (Holland).

Source: **Reprinted from** *The Homo within the Sapiens*, **Preface**, page xxxv, copyright (2021) Jorge A. Colombo. With permission from Nova Science Publishers, Inc.

FIGURE 48 A tzompantli relief in Chichen Itza, Mexico (https://commons.wikimedia.org/wiki/File:2014-01-03_Tzompantli_in_Chich%C3%A9n_Itz%C3%A1_anagoria.jpg).

FIGURE 49 Tzompantli stone detail in the Templo Mayor, Mexico City (https://commons.wikimedia.org/wiki/File:Detalle_de_tzompantli.JPG).

FIGURE 50 A view of the devastated Hiroshima.

A ***tzompantli*** or **skull rack** (Figures 48 and 49) is a type of wooden rack or palisade documented in several Mesoamerican civilisations, used for the public display of human skulls, typically those of war captives or other sacrificial victims.

According to Rensberger (1977),[7] Dr Woodrow Borah, an authority on the demography of ancient Mexico at the University of California, Berkeley, has recently estimated that the Aztecs sacrificed 250,000 people a year, with some of the skulls transformed into masks.

HIROSHIMA, August 9, 1945

The explosion generated a heat wave of more than 4,000˚C within a radius of approximately 4.5 km.[8]

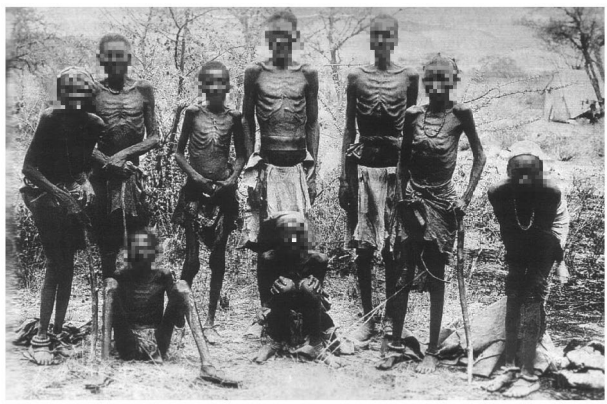

FIGURE 51 Germany's extermination programme for black Africans (https://www.timesofisrael.com/in-germanys-extermination-program-for-black-africans-a-template-for-the-holocaust/). Images of survivors of the Herero genocide foreshadowed similar scenes from the liberation of Nazi death camps.

Source: Wikimedia Commons (https://www.smithsonianmag.com/history/brutal-genocide-colonial-africa-finally-gets-its-deserved-recognition-180957073). (Image modified by author, faces masked)

FIGURE 52 Bergen-Belsen Concentration Camp, April 1945. Dr Fritz Klein, the camp doctor, standing in a mass grave.

Source: Wikipedia (https://es.wikipedia.org/wiki/Holocausto#/media/Archivo:Mass_Grave_at_Bergen-Belsen_concentration_camp_-_Fritz_Klein_-_IWM_BU4260.jpg).

FIGURE 53 Bodies of victims along Qinhuai River out of Nanjing's west gate during the 1937 Nanjing Massacre.
Source: Wikipedia (https://commons.wikimedia.org/wiki/File:Nanking_bodies_1937.jpg).

One of the main colonialist countries, Great Britain, destroyed records of colonial crimes according to *The Guardian* (2012).[9] Also, terror reigned during the Franco revolution in Spain,[10]

> From the very beginning, Franco's Nationalist troops initiated a campaign of terror in which they killed, tortured, and shamed perceived political opponents. In August 1936, for example, they gunned down up to 4,000 alleged Republicans in the town of Badajoz and then burned the bodies at a local cemetery. Similar massacres occurred in Málaga, Toledo and elsewhere, each time with the tacit approval of the rebellion's top leaders…

The twist that projects from dominance into cruelty reflects a neurobehavioural path that operates under a cultural and institutional context that promotes or allows it. During the days of the Roman Empire, crucifixion was a current means to deal with opponents or just the menace of being one. In modern times, torture and killing by dictatorial governments represent sad evidence that *human civilisation* has not been able to avoid succumbing to the twisted – humane edited – expression of ancient animal drives. Conscientious, programmed cruelty – or men hunting men – due to power or beliefs represents an obscure human profile that has come to light throughout human history when humans lose their grip over its human core, an everlasting menace.

> At a no longer verifiable point in distant time, the human mind discovered that the crude weapons it had fashioned to hunt and fell animals could be turned against human beings with the same deadly effect.
>
> *(cf., Bryant M. 2015. In A World History of War crimes)*[11]

*

Human Slavery

Throughout our civilisation, humans from defeated tribes or under autocratic past and modern regimes were turned into an object of commodity, bought, detached from their families and native soil, and sold in distant social contexts (Figure 54 represents inhuman conditions on a slave ship). This process of objectification and imposed extraction of human beings is not only a social perversion of the past but is still present under cultural veils of different natures in modern societies and included in ideological, racist manifests.

> The transatlantic slave trade reached its peak between the 17th and 18th centuries spurred by the growth of large plantations in North and South America. To increase profits, slave ship owners divided the hull into multiple decks, so that they could transport as many slaves as possible. The conditions were horrific and led to incredibly high mortality rates. The slave ship Henrietta Marie, which sank off the coast of Key West, Florida, in 1701, carried up to 400 slaves in a single voyage, with some chained to the bow of the ship during the weeklong passage. Notices of Brazil, Walsh, 1831[12]
>
> Between 1517 and 1867, 12.5 million enslaved Africans were forced onto ships to begin the Middle Passage to America. Fewer than 11 million men,

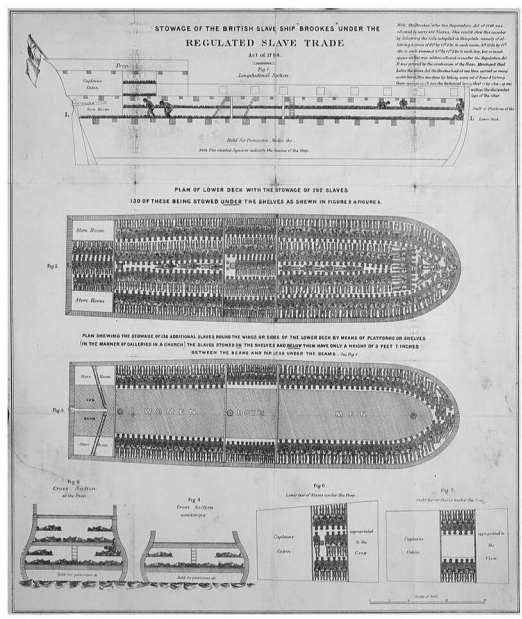

FIGURE 54 Sketch of the stowage of the British slave ship "Brookes" under the Regulated Slave Trade Act of 1788.

Source: US Library of Congress (https://www.loc.gov/pictures/item/98504459/).

> women, and children survived the journey. Of these, about 40 percent, mostly from Angola, landed in Brazil, where the trade continued until 1850.
>
> Every national community of European merchants participated in the transatlantic slave trade, including Swedes, North Germans, and Danes. Because of Brazil's early start and late finish, in addition to successive commodity booms in sugar, gold, and coffee, Portugal was the largest overall transporter of enslaved Africans. Great Britain became the dominant slaving power in the eighteenth century, accounting for about 25 percent of the total….[13]

The above images and quotations are a small sample of means, devices, commerce, and profit created by humans to deliver on other humans' pain, anguish, and slow death due to beliefs, politics, profit, or plain social dominance or unequal rights. Perhaps more horrifying examples[14] could provide further evidence of the lack of limits on these sociopathic behaviours, which have changed forms and means but are still practised under varying social contexts.

Statements from Smith's (2020) astounding book on inhumanity are perhaps some of the crudest examples of subjacent inhuman drives exposed when they acquire absolute dominance and degradation over humans in these cases,

> Dehumanisation fuels the worst brutalities that human beings perpetrate against one another. It's not just a problem of the modern, industrialised world: it's haunted humanity for millennia. We find traces of it in writings from the ancient civilisations of Egypt, China, and Mesopotamia, in Medieval European characterisations of Jews, and Medieval Arabs' characterisations of Black Africans, and in far-flung indigenous cultures, such as the headhunting Munduruku people of Brazil who referred to their human prey as *pariwat*—a word that's otherwise reserved for game animals.

Bringing up these kinds of images, events, and narratives has the sole purpose of providing grounds to stress and unmask deviant drives immersed in our species' construction and emerging under some current cultural contexts within a shared context of asserting dominance. They are determined to exert physical and emotional dominance to the limits of cruelty for profit, power, or under institutionalised sociopathic conditions. It represents a deviant, programmed behaviour that departs from ancestral animal survival drives of stalking other species aimed at feeding or competing for reproductive success, not for subjecting opponents to carefully detailed or gross suffering tortures. In this case, dominance is transformed into a pathological behaviour that violates any moral value.

As Smith (2012) asserts, judging from available examples, human nature is violent to the extreme. This is exactly Wrangham's hypothesis; that we have inherited a dominance drive from our primate ancestors.

In some animal species, quick sacrifice by a new lion leader of cubs conceived by a defeated leader is applied to exert dominance and consequently ensure new

genetic continuity or exhibit predatory behaviour to secure feeding demands and territorial grounds. Dominance behaviours at the human level are expressed on power distribution based on military strength, informational, financial, corporative, or material/technological grounds to displace competitors and gain market dominance, or as declared encounters (warmongers) to physically eliminate or cancel strategical territorial, political, or financial (profit) competitors. Through policies implemented by dominant corporations in the market and generators of opinion, humans have transformed market tendencies of material needs into the construction of supposedly collective needs, thus building its intraspecies dominance into an expression of a predatory culture over the opponent or *the different*; be it of a social, ideological, financial, or religious nature. The goal is to cancel the competitor and act on a collective consumer receptor modulated by propaganda. In other words, to generate a consumer population subjected to the marginalisation of knowledge leading to programmable or domestication of collective priorities and tendencies, minimising claims on the true basic needs for individual development. This helps build a reason why the so-called "globalisation" is instead applied to communicational/transactional domains – limited to certain socioeconomic strata – in a world in which approximately one-third of its population suffers from deprivation of the minimum resources for a safe habitat, health protection, and access to cognitive development.

As stated in Colombo (2021a), our species' animal and cultural condition impose needs and trends in a continuous biosocial interaction, where cultural construction acts over basic biological demands and ancestral behavioural drives (survival, territoriality, reproductive trends, nutritional quality, relative group prevalence in a gregarious organisation with hierarchical structure) that affects behavioural expression. Such "underground" animal-based drives condition our behaviour and become most manifest at times of crisis (e.g., survival menace, poverty, indigence, social marginality, belligerence, dominance).

Homo evolution succeeded in delivering a species able to combine the expression of most contradictory behaviours, such as solidarity, kinship, and creativity, with cruelty, warmonger, oppression, sadism, privileges, slavery, and social degradation. The fields of our planet Earth are fertilised with the remains of a history of wars, hunger, and cruelties that support the emergence of defiant creatives and utopians in search of a "human subspecies" with improved social values and goals.

The horrifying human behaviours throughout human history expressed as torture, cruelty, oppression, degradation, manslaughter, warmonger, and genocides suggest that our brain and mental development that allowed progressively unthought, revolutionary achievements in several creative domains also engendered the *public enemy number one,* that represents an additional component to social dominance of *the evolutionary trap*. The *Mr Hyde* side of our species, whether expressed as institutionally allowed (wars, pollution, ecological degradation, poverty, educational and public health inequalities, excessive wealth accumulation,

torture, and mass murders) or forbidden (individual crimes, stealing, violating norms by the common citizen) behaviours, represents a sort of *evolutionary trap* for our human species, from which we ought to find the way out.

As suggested earlier, the human species is composed of continuously evolving neurobehavioural identities interactive with the physical environment, their social environment, and introspective behaviour, such that under normal conditions, new socio-cultural components are interactive with ancient neural circuits involved with ancient animal drives (survival, dominance, territoriality, feeding, reproduction, gregariousness). The latter provides the essential, evolutive, behavioural scaffolding with which culture interacts. This ancient behavioural inertia provides the basis for "*the evolutionary trap*" that generates the unstable, *bipolar* (on evolutive behavioural comparative terms), individual, and social behaviour often yielding to sociopathic, unnatural behaviours that feed wars, oppression, crimes, and tortures, and other means not related with the provision of natural survival demands but moved by dominance and profit. It seems worth stating once again that means attempting to defuse these behaviours resorted to emotional (religious) and intellectual (ideologies) strategies that sponsored fanatic standings leading to those behaviours that were meant to be defused. Solidarity, caring, and creativity often appear expressed at the individual or group level yet are frequently suffocated or dimmed by the dominance of the sombre profile described previously.

Human history is the history of a species capable of the more atrocious and destructive behaviours, surprising creativeness and construction of knowledge and beauty, and examples of solidarity, values that keep feeding the astonishing "human adventure." Should we consider the coexistence of two Homo sapiens varieties or subspecies? And if so, in due time, which will prevail or territorially diverge? Will profit and dominance drives finally erase creativity and solidarity from human behaviour?

While creativity provides a constructive profile of our species, the primal, ancient animal drive for dominance places its future at risk. This combination generates a distorting impact on the global perspective of our collective future and ecological conditions. Hence, minorities able to embrace the most astounding creative challenges, and the dominant greed of other minorities, leave most individuals at various levels of distance from either of each prevailing species' expression. This majority may provide supplementary means but remains aside from either, unable to ride the ancient, forceful, untamable horse of human creative adventure. However, its sheer numbers may often impact the path of social development. The alternative for those who lack resources or opportunities, and are being drowned out by their socio-cultural marginalisation, is pressing for equal opportunities in education and labour opportunities. It is perhaps their only chance for survival and self-worth.

So, on institutional grounds, the main path towards social equity is true (not as a gift but as sharing), integrated (applied to all social domains), systematic, solidarity behaviour construed as a political ideology, not as an expression of class prevalence.

*

Institutional and Citizen's Rights Outcomes of Social Construction Profiles

To the human evolution sequence proposed by Mirazon Lahr (2016a), it should be added the gradual Balkanisation process of humanity concerning access to knowledge, quality of life, technology, and institutional outcomes affecting freedom and cultural priorities. A basic concept of democracy is suggested by Lührmann and Lindberg (2019), a statement though that is missing equal access to education.

> Our notion of democracy is based on Dahl's famous conceptualisation of electoral democracy as "polyarchy", namely clean elections, freedom of association, universal suffrage, an elected executive, as well as freedom of expression and alternative sources of information.[9]

Regarding institutional outcomes, a liberal (representative) form of democracy and forms of autocracy would represent the main opposing historical options, with potential deviant risks.

> The number of democratising countries has dropped by almost half compared to ten years ago. Currently, 16 countries are democratising that are home to only 4% of the global population.[15]
>
> … the main contemporary challenge to democracy is its gradual demise after illiberal or authoritarian-leaning political leaders come to power in elections and aggrandise their prerogatives at the cost of parliaments and independent judiciaries.[2] We denote here "authoritarian" actors as being those that are openly in opposition to the democratic regime. Their intention is to transform democracy into some sort of autocracy.[16]
>
> … a global democratic recession began in 2006 and has persisted – and deepened – over the past 14 years.[17]

Luhrman and Lindberg (2019) state an ominous fate for institutional outcomes based on basic democratic principles, as they state that evidence of contemporary declines in democracy amount to the third wave of autocratisation. According to the authors, a key finding is that the present reverse wave – starting after 1993 – mainly affects democracies, unlike prior waves. What is especially worrying about this trend is that historically, very few episodes starting in democracies have been stopped short of turning countries into autocracies.

Regarding citizen's rights in our *polychromatic* world in social construction and citizen rights, a series of statistical data provide evidence of profound developmental inequality and degradation of citizen's role in political and institutional processes, as also globally described in Chapter 3.

***

Notes

1 https://www.livescience.com/oldest-cannibalism-found-in-trilobite-fossils?utm_source=SmartBrief&utm_medium=email&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_content=D602C649-BD0D-4541-8FCD-27C83652CC08&utm_term=e1d8bf04-8d1c-4449-910d-e5e260c8ae79; the Cambrian Period was the first geological period of the Paleozoic Era and lasted 55.6 million years.
2 https://www.nationalgeographic.com/history/article/dna-study-ancient-massacre-victims-raisesmore-questions-answers?cmpid=org=ngp::mc=crm-email:src=ngp::cmp=editorial::add=Compass_20210619&rid=95527DDF86250D8AB073474627963407
3 https://tortureum.com/history-of-torture/.
4 https://www.britannica.com/event/Massacre-of-Saint-Bartholomews-Day.
5 https://www.cambridge.org/core/books/abs/rivalry-and-revenge/executions-and- massacres-during-the-spanish-civil-war/17F4C5C5C17F6ED7FA37718E94A2EA7F.
6 https://www.bbc.com/mundo/noticias-america-latina-45714908.
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12 https://www.nbcnews.com/id/wbna24714547.
13 https://encyclopediavirginia.org/entries/transatlantic-slave-trade-the/.
14 https://www.google.com/search?q=instruments+of+torture++human+history&tbm=isch; https://www.thecoolist.com/medieval-torture-devices/.
15 https://www.tandfonline.com/doi/full/10.1080/13510347.2021.1922390.
16 https://www.tandfonline.com/doi/full/10.1080/13510347.2021.1928081?src=recsys.
17 https://www.tandfonline.com/doi/full/10.1080/13510347.2020.1807517?src=recsys.

13

HOMO SAPIENS

A Janus-Faced Species or Two Coexisting Varieties?

Besides prioritising policy investments aimed at erasing poverty and providing universal access to education, promoting knowledge is a potential source of universal awareness on actions, consequences, and shared progress instead of promoting dominance homed within a wealthy minority. Main decisions that affect common welfare and ecological equilibrium should not be in corporate and political hands, mainly aimed at profit and market dominance.

According to Flinn et al. (2005), the stage is set for a runaway selection, whereby the more cognitively, socially, and behaviourally sophisticated individuals can outmanoeuvre and manipulate other individuals to gain control of resources in the local ecology and the behaviour of other people. Control is exerted through dominance by enforcement or political and media means. In this regard, it seems unavoidable to recall de Waal's (2005) comments on our species,

> One can take the ape out of the jungle, but not the jungle out of the ape. This applies also to us, bipedal apes.
>
> Being both more systematically brutal than chimps and more empathic than bonobos, we are by far the most bipolar ape.

Despite de Waal's (2005) assertion, there remain some doubts as to whether we collectively belong to a *bipolar (Janus-faced)* species, capable of the more atrocious and destructive behaviours and of surprising creativeness and construction of knowledge and beauty values that keep feeding the astonishing "human adventure." Or should we consider the coexistence of two *Homo sapiens* varieties or subspecies? Moreover, if so, in due time, which will prevail or territorially diverge?

As Alexander (1990) commented, most are puzzled over the insanity of our current competition among financial and military dominant groups and

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the international arms race with its threat of mutual extinction or the loss of civilisation. Indeed, the runaway social process invoked here would seem unstoppable except because of either calamity resulting from large-scale aggression or irreversible environmental damage. The author suggests a virtual reversal of the current striving direction, which will not be easy to reach.

*

As commented by Hermann (2017), dominance and aggression are animalistic traits handed down to humans through a succession of predecessors as a means of survival.

Additionally, mingled with it is a brief reminder from Henrich and McElreath (2003) on ancient drives from where our species behaviourally evolved and managed to build a cultural framework. Based on behavioural adaptations that explain our species' immense success, this is cultural in that they are transmitted among individuals by social learning and accumulated over generations.

Various genetic admixtures underwent the evolution from *hominins* to *Homo sapiens* and its *Homo* ancestors (Hammer et al. 2011) and *Homo's* common evolutive origin with *Pan troglodytes* and *Pan paniscus*. Thus, it seems to be a necessary conclusion that *Homo sapiens'* construction contains evolutive inertial components represented by a mosaic of genetic influences from species adapted to strife different ecological requirements and strategies for species survival. This admixture carries at least one universal, dominant drive represented by *survival* efficiency conformed under ancient ecological demands and competence. Behavioural inertias stemming from our ancestral *melting pot* and hidden under cultural and ethnic variables survive in our basic behaviours expressed most clearly under conditions staged by dominance strategies or psychological and physical menaces, distress, or crisis conditions.

*

The following statement implicitly underlines the crucial impact of general education on citizen values, a domain in the hands of the ruling/dominant classes in each country, for *cultural legitimation,* as mentioned in Gintis et al. (2015) has a relative standing,

> The future of politics in our species, in the absence of concerted emancipatory collective action, could well be something akin to George Orwell's *1984*, or Aldous Huxley's *Brave New World*. However, humans appear constitutionally indisposed to accept a social dominance hierarchy based on coercion unless the coercive mechanism and its associated social processes can be culturally legitimated.

*

Escape from *the Evolutionary Trap?*

Ancient animal drives aimed at satisfying feeding, limited territorial control, and reproductive demands have been reformulated in humans towards an expanded version leading to unrestrained dominance, increased military and financial power, and corporative profit. Greed and political megalomania are expressions of human social psychopathy that lead to continuously assuming the right to expand its limits of property and power rights.

In non-human gregarious animal societies, leadership is based on physical and behavioural characteristics, competition, dominance over group interactions, and limited – self-contained – rights in reproductive, territorial, and feeding affairs. This is comparable to the pre-expansionist, hunter-gatherer, farming, and tribal stages in human social development.

In its uncertain path towards behavioural sophistication (based on knowledge, beliefs, values, priorities, creativeness, and competition), culture and dominant behavioural profiles in *Homo sapiens* became socialised and an embrained factor. This provided a basis for differentiation among groups of commons regarding hierarchies, power carriers, and dominance. This increasingly "disparate" social distribution of "commons" and "differents" (race, ethnicity, wealth, social position, craftsmanship, belief, parochialism, values) generated social groups whose members conditioned their solidarity or bonding to some of those characteristics. Such multiple sources of potential dividers are expressed in various forms. Whether this socio-cultural parcellation becomes a source for species enrichment or a source for dissent and aggression remains bound to the evolution of our emotional and rational domains.

The evolution of leadership in the various fields of humane activity is the consequence of a multiple-factor equation due to the inclusion of relative values in different social, material, and behavioural orders. The equation should include dialectic interaction as a positive component, not a fracturing one. In this context, freedom should be exerted as a responsible action within a social context. Once a community develops a conscience about its individual and collective relative freedom and common responsibilities, there is no absolute freedom. Due to the range of possible human behaviours – including derangement into abnormal behaviours (as definable under a neuropathological context) – social freedom must abandon a utopic concept and embrace communal values and practical norms able to coexist in mutual survival conditions. This implies continued social learning, an evolutive dynamic process that includes institutional construction and shared knowledge and responsibilities.

These complex interactions result in a spectrum of relative individual freedom, conditionally contained or limited within autocratic and democratic systems. Thus, human institutional projects would reflect strategies to manage intra- and interterritorial power disputes and individual social rights. Human civilisation history shows an abundance of attempts, most falling under diverse forms of expression of dominance. This is due either to social class and beliefs or,

in modern times, moulding behavioural and consumerist goals through expert psychologically based publicity fed by profit goals from corporative structures and a persistent parochial sense of belonging that conditions dominance profiles. How to build a constructive consensus in a culturally disparate world, unless detaching dominant behaviours?

The drive towards dominance and unleashed profit-seeking behaviour is one social component that leads us to *the evolutionary trap* as if it were a social gravitational force. It seems that the only way to reach true forms of democracy and freedom of action is through maximising education, cognitive skills and alertness, solidarity, social responsibility, ecological equilibrium, and truly equal rights, as well as behavioural expression under an interactive experience. This implies control of ancestral human drives and embracing values that foster human growth and accept human differences in an equal rights context.

Should competition not be fuelled by sectorial ambitions seeking profit, social dominance, and prevalence, our species could develop scientific-technological projects with other objectives and levels of urgency and investment. Then, its achievements could be better utilised and assumed by the planetary community.

Given that our current living conditions have moulded social behaviours to accommodate and institutionalise dissimilar educational access and individual roles based on parochial standing, class differences, and profit pursuit, the previous concepts may sound utopic. Nevertheless, they are proposed as one possible road to attempt to induce a change of values in our living system.

*

The above statements imply that the species has succeeded in transiently repressing/masking or hiding primal drives under social and cultural constructions to minimise falling into *the evolutionary trap,* definable as ancestral behavioural drives described in previous chapters. Hence, certain preconditions must be placed at play. They include promoting and deriving financial support for worldwide education and living health conditions, avoiding subsuming cognitive and emotional awareness potentials under poverty, and numbing cultural (informational) and environmental agendas. Since we should start finding solutions, financing the improvement of worldwide living conditions, and deterring ecological degradation, the former should take priority over promoting or financing those outer space projects that do not have a predictable proximal, direct impact on general living and environmental conditions. The probability of a collective change is tightly woven onto conditions that either foster or suppress cognitive and emotional awareness. As described, the horizon of present world conditions represents a culturally fractured horizon, subdued under different profit and religious priorities.

Perhaps previous descriptions build a context that promotes the evolution of diverging *Homo sapiens* species varieties. In other words, would current socio-cultural profiles anticipate diverging evolutive outcomes? However, would

they be able to avoid the same ancient *evolutive trap*? As mentioned previously, this process would imply not suppressing but replacing ancestral behavioural drives handed down to humans through a succession of predecessors as a means of survival.

Repeated cultural practices along our species' ancient history generated and stabilised preferential synaptic pathways and behavioural profiles, maximising the probability of certain adaptive profile behaviours and conditioning genetic expression. However, once the basic behavioural hardware (territorial, nutritional, survival, and reproductive drives) of the species had been organised, subsequent development (based on socio-cultural contexts) depended on programs that have the substrate of neural networks providing conditional connectivity (neurobehavioural plasticity). It is worth commenting that the construction and expression of cognitive, rational propositions on social domains have seldom been independent of the emotional dimension. In this sense, the ancient and persistent physical fragility and emotional insecurity – in the face of the occurrence and demand imposed by natural events of various kinds – which permeated the history of our species from its ancestral origins, contributed to the construction of a core of magical, virtual, behavioural drives.

Human cognitive capabilities and emotional profiles represent a broad spectrum that defines social insertion, creativity, and productivity. Access to improve cognitive development is not only a question of cultural traditions but a consequence of public policies that sink individuals into poverty and detachment from information access and constructive social roles. The central point is how to construct a society with equity in developmental conditions, educational opportunities, and basic personal wealth and avoid the imposition and social consequences of institutionalised hierarchical dominance or prevalence while recognising different dimensional contributions to the community's progress. As previously mentioned (Colombo 2022) and insisted here, there is a road of unknown future to new social collective values, respecting cultural contexts but devoid of institutionalised or corporative dominance forms. Excessive personal wealth accumulation and political power represent a formidable challenge. Equating social conditions in education, health, and development opportunities would temper the continuing ancestral animal drives and human behavioural potential deriving into an *evolutionary trap*. The virtual superstructure with which we humans construct behavioural and cultural webs has underlying connections with an ancestral one of a biological nature. This less sophisticated and complex web was built before language-based symbolic constructions emerged based on basic animal behavioural scaffolding and derived forms of social behaviour interactions expressed in the animal kingdom. As stated in Colombo (2021a), this less glorious and brilliant vision of our human nature origins – compared to that offered by the beliefs of a supposed exceptionality native to our species – allows us to explore an integrated conception of our behavioural evolution regarding the universe of our collective, social, and cultural organisation.

Religious beliefs, cultural values, and institutional norms attempt to generate profound cultural changes by different means (emotional, rational) to tame or

build a preformed path on our species' evolutive history. If possible, future human social development should transit progressive self-selection processes, favouring the expression of pacific-prone constructive primate behaviour. Considering this deconstruction of an evolutive *bipolar* (dominant/warmonger vs solidarity/pacifist) primate behaviour, it would eventually tend to replace ancient neural circuits and animal drives expressed as power-seeking leaderships and revenge among subdued populations. Would it perhaps be possible and enduring if we come to grips with our primary socialised animal construction and become self-aware of such conditions as triggers for behaviour changes? Since these circuits are involved with basic means for survival, this would probably not be universally accessible to members of our species but primarily to those carrying the "bonobo profile" (sic) with pacific drives conditioned by biosocial life histories and socio-cultural environments.

As mentioned in Colombo (2022), territoriality and prevalence are universal domains in survival behaviours within the natural kingdom. Whether having solitary or gregarious social habits, animals and vegetables (Baluska and Mancuso 2020) show territorial behaviours towards conspecifics and prey on them or reject those that compete with feeding or reproductive resources. Besides new sets of active genes that would condition new brain developments, *Homo sapiens* carries an essential, ancestral *backpack* of *multiple donors* imprinted in basal brain neural circuits subserving basic needs and drives.

These considerations pose, on neurobiological grounds, the question of whether drives anchored in phylogenetically comparatively primal, ancient, basal neural circuits express similar plasticity to those mainly involving neocortical functions. In critical settings, individuals tend to express those ancient basic behaviours at least partially detached from neocortical control. It seems opportune to remind here the comment made by Neuberg et al. (2010), in the sense that humans are animals, and as such, human brains, like the brains of all animals, evolved via natural selection to solve the types of recurring fitness-relevant problems that our ancestors faced long ago. Also, perhaps more significantly, according to Neuberg (2010), people are social animals. Thus, the problems faced by our ancestors included not only those faced by all animals (e.g., resource acquisition, self-protection, mating) but also those specific to social life (e.g., affiliation and coalition maintenance, status-seeking, intergroup conflict).

It should also be considered (Colombo 2022) that, besides repressing/releasing operating genes that would condition new brain developments, *Homo sapiens* carries an essential, ancestral *backpack* imprinted in basal brain neural circuits subserving basic needs and drives. Its culturally transformed or hidden expression occurs as an institutionalised dominance/prevalence behaviour, a thrive for survival, and hierarchical social constructs. This could occur spontaneously under dynamic social circumstances or transformed into virtual (cultural, ideological) domains. Its relationship with the continuous development of sophisticated material culture interactively evolves our collective mind and virtual constructions. *Homo sapiens'* evolution is bound to the development of instruments of progressive

complexity and power utility, developed into a – material – cultural technology that resets the relationships between individuals and between them and the environment. Socio-cultural differences among worldwide communities – and within them, also among its constituents – result from a different history and dynamics of genomic, material, and environmental interactive human constructions. This concept supports limiting the current concept of *globalisation* to limited strata of the socioeconomic domain.

*

There are no hints on how our species would evolve and whether it would involve species variants. The present socio-cultural and technologically severely fractured human community condition seems to anticipate possible divergent roads, with a profound gap between wealth and education distribution extremes.

Is such a stage immutable, fixed by an *evolutionary trap* moulded under human drives and a set of interests? Or can we expect and seek self-understanding, as Alexander (1999) proposed?

Until we do not correct to any appreciable extent the educational *fault* existing between socioeconomic strata (see UNESCO Report 2021),[1] power will keep coming out of the hands of a relatively few, and knowledge will not have the desired collective insertion and application, nor its adequate social response. Ordinary citizens will be unarmed to modify present trends imposed by elite minorities driving corporative and political decisions that affect our collective future.

Inhibitory processes that restrain the expression of behavioural drives and self-control of intended behaviour represent a universal domain triggered by an arch of different signals, depending on the considered species. Examples of such inhibition abound in the natural kingdom since it is a component of survival strategies. These processes are enforced by different means in social animal groups to maintain hierarchical standards in unstable equilibrium with other biosocial variables (individual change in social insertion or mobility, developmental increase in hormonal levels such as testosterone, and dynamics within hierarchical social structures).

Among humans, prefrontal circuits represent a neurobiological hierarchical node modulating open behaviours. Failure to activate behavioural inhibitory processes results in inadequate social behaviour or triggering pathological profiles. The first case results in an educational experience that tends to modify future behaviours in social encounters. Conversely, society tends to enclose and disable pathological expressions representing an actual or potential life threat to other citizens. Unfortunately, some sociopathic trends infiltrate societies or even become a representation of an extended vicious – profit- and privilege-seekers – behaviour affecting human rights. Historical examples abound and draw an excuse for further details, but they result in different ideological, religious, or

corporative campaigns that mobilise the social imaginary and collective. So, what is allowed or forbidden depends on social, institutional, educational, and emotional variables. The collective expression of some of these behaviours often results in campaigns of conquest, cultural replacement, or open confrontations.

Hence, the components or triggers of collective human social expressions are affected by social plasticity moulded by financial, religious, kinship, or nationalistic components.

Human modulation of primal drives could promote solidarity and diverse cultural acceptance and modulate greed and profit trends, implying that escaping *the evolutionary trap* could be within our reach. We ought to change our sets of values and irrational alliances, i.e., to reset our interaction with ancient animal drives. This happens in extraordinary circumstances, such as during war casualties and institutionalised solidarity. It comes to mind the dramatic rescue of 12 boys' soccer team members and their coach trapped by rising floodwaters deep in Thailand's Tham Luang cave system in 2018.[2] The profile of this behaviour suggests that at the core of our human species lies the hope for a change of values based on new social structures. The possibility that our species is a hybrid of opposite behavioural trends, as suggested by de Waal (2005), brings us hope, as he states that being both more systematically brutal than chimps and more empathic than bonobos, we are by far the most *bipolar* ape. As discussed, the question arises as to whether this assertion applies to each individual or implies the coexistence of two human species variants.

We tend to be prisoners of other powers of decision and of our level of ignorance, which others promote and manage. If people do not respond accordingly and efficiently, our future will continue being drawn by political, corporative, and experienced emotional architects, i.e., the elite of decision-makers and by the degree of our permissive functional absence from such a scenario. Unless we acquire knowledge and act to control and interact within the present "delegated democracy" forms, people will remain *part of the landscape*.

An artistic view (Figure 55) depicts our long, uncertain, peregrination towards a still undefinable but desirable form of utopia, where war conflicts are absent, and the central values are solidarity, ecosystem protection, coexistence, joint development, and well-being. Unless we hold to these ideas in an epic enterprise towards collective freedom of thought and expression and avoiding human-against-human war conflicts, profit and wealth dominance, and profound inequalities, we will keep perverting our collective existence while allowing ancestral traits to obscure our species' creative potential and polychromatic human expressions. Granted, it would imply recomposing the social power structure, reformulating the fractured social structure, and challenging corporative power domains. Though, as stated by Herrman (2017), dominance and aggression are animalistic traits handed down to humans through a succession of predecessors as a means of survival.

FIGURE 55 *A Long Way to Utopia* (2). (Shadows of our constant peregrination). 2014. Mixed technique. 120 × 80 cm.
Source: JAC (Colombo. Author's initials).

There seems to exist several possibilities for the future sociality of our species (some more constructive and universal than others); perhaps it will significantly depend on how we put into practice the following thought,

> We do not choose the time we live in, but only the way we respond to it.
> *(Unknown source)*

Should we become wise and educated enough to overcome greediness and dominance drives in their multiple forms (i.e., escape from *the evolutionary trap*), it may be pertinent to stop on the likelihood expressed in the following comment[3] and improve our search for a continued, coexisting, human evolution beyond cultural differences,

> When we update this prior in light of the Fermi observation, we find a substantial probability that we are alone in our galaxy, and perhaps even in our observable universe…' Where are they?' (Fermi's question regarding Fermi's paradox)— probably extremely far away, and quite possibly beyond the cosmological horizon and forever unreachable.
>
> *(Sandberg et al. 2018)*

Are these thoughts ignoring the cultural richness that our species has reached and projects as future possibilities? The core of the problem resides in its relative presence, cognitive accessibility, and worldwide social strata. Also, in the relative *weight* to reset the gross imbalance in wealth distribution and the possibility of genuinely sharing cognitive developmental cultural products.

Within this fractured picture of human present social reality and possible futures lies the risk of an uneven dimension of a tug-of-war between *the creatives* and *solidarious* and *the corporative profit-seekers*, including political dominance interests that are powering and moulding our species' trends. The products and power of creativity should not be a privilege of a few.

In short, our species' future faces sombre menaces involved in our *evolutionary trap*: the environmental-climate demise due to the relentless seeking of financial profit, poverty-powered cultural imbalances, and the increasing life and culturally destructive – power-seeking – conflicts based on *dominance drives*. This is lucidly and critically stated by Gintis et al. (2015):

> … humans are much more capable of forming large, powerful, and sustainable coalitions than other primates because of our enhanced cooperative psychological propensities. Such coalitions also served to reinforce the moral order as well as to promote cooperation in hunting, warding off predators, and raiding other human bands. This implies that many forms of sociopolitical organisation are compatible with the particular human amalgam of hierarchical and anti-hierarchical predispositions that can result in either independent egalitarian bands or well-amalgamated large societies… In particular, this implies that there is no inevitable triumph of liberal democratic over despotic political hierarchies. The open society will always be threatened by the forces of despotism, and a technology could easily arise that irremediably places democracy on the defensive.

In Colombo (2022), we inquired whether we are heading into a deepening of the socio-cultural gap and the construction of a "eusocial" organisation comparable

to the one described in insect species with fixed hierarchies and social roles. Among hypothetical variants, there should be an alternative for sociality based on solidarity, equal rights, and collaborative development opportunities. Although there is an uncertain road towards utopia, our species should not abandon such a chimeric horizon.

Considering the worldwide multiplicity of social structures, beliefs, moral and social values, cultural histories and profiles, the profound cognitive inequities, and the behavioural pressure from ancestral animal drives, one would anticipate a bleak probability of meeting or approaching such a pledge for a chimeric, unique horizon for our species. When the potentially creative interaction of a multicultural world is replaced by its hidden, worst competitive ghosts, its positive impact is replaced by destructive forces.

Is this double-faced behavioural dimension puzzle reducible to some basic, universal principles to which our humanity would abide? Instead, higher probabilities would seem to be represented by our *evolutionary trap* expressed as a deepening of cultural and technological gaps among communities and world citizens. This stresses social constructs and promotes – replicates – primaeval moves of groups abandoning the main developmental stream in either direction, i.e., towards social isolationism, extraterrestrial incursions, abandoning earth-bound projects, or succumbing to unacceptable levels of human conditions. It further dissociates our human species, with potentially different evolutive outcomes tightly linked to *the evolutionary trap* that conditions the behaviour of our *bipolar species*, stressed between dominance/prevalence drives and solidarity/sharing behaviours. The spread of behavioural and cultural profiles and values stress the comparatively simple dichotomy between individual (profit, personal gain, power-seeking) and collective social priorities (sharing, equal rights, universal education, solidarity).

Within this complex, uncertain perspective, it seems still valid that the following statement briefly rephrases this existential conundrum for our species:

> If we abandon the utopian dimension of change, we will continue to repeat in an uncritical way all the perversions of the system.
>
> *(Eduardo Colombo)*[4]

Of course, this true statement would be impossible unless we detach from the ancestral animal behaviour, those drives that corner our species into *the evolutionary trap.* Because, let us face it, beyond our creativeness and acts of solidarity expressed under specified circumstances, our species origin has an aeons-long complex animal inheritance in which basic survival and dominance behaviours were the scaffolding for individual and species endurance and survival throughout time, under harsh, changing environmental conditions and life risk prey-predatory interactions. Our species must overcome this formidable *backpack* to allow our most cherished human values (solidarity, equal rights, creativity) to emerge and fully predominate. In modern terms, *the evolutionary trap* has exchanged physical dominance for cognitive

gap and dominance, and an excessive wealth accumulation transformed into social power – a sort of financial cast – media dominance and political construction, a web that pretends to keep moulding and building our collective present and future to their best profitable goals.

As stated before (Colombo 2022), several of these questions could generate a wealth of hypotheses. Perhaps they could start to be answered once societies foster merit, and equal opportunities and change cultural values towards social recognition and praise, as opposed to material profit and its spin-off consequences of dominance and social privileges. In a world with severe extremes, answering these questions evokes a utopian character. However, the answers we give to them are the ones that could open new evolutionary roads for social construction. For, the multifactorial composite of social, economic, historical, and financial domains in a multilocular, polychromatic world (besides the promoted *globalisation*) prevents from universal formula to solve possible future routes that would improve human well-being.

At least two behavioural domains seem to be certain; these are the convivial conditions of political and corporative powers to make decisions and destroy the public's right to individual freedom and social construction regardless of national boundaries and the gap in material and cultural means to detect and react to the manipulation of public opinion on sociopolitical and consumerist domains. That is, economically conditioned citizens with misinformed and manipulated social drives continue falling prisoner to the dynamics that tend to consolidate and sustain current inequalities and blur consciousness levels for making survival decisions.

In the few millennia that *Homo sapiens* has led its predominant existence, we have brought our subsistence and that of the planet to a self-generated condition of potential extinction risk. As if the absence of natural predators had played a trick on the natural balance. *Homo* now freely preys on his fellow humans and the environment. With the aggravating circumstance that its satiety is no longer biological but depends on other constructions (commercial, corporate, classist) whose saturation limit is practically unknown – except for the secondary effects it generates. Basic principles of animal behaviour such as dominance, territoriality, competition, aggression, and survival continued to drive the sophisticated behaviour of the new, dominant primate, which would finally express itself in the form of national or supranational, oligopolist, corporate, political, and financial organisations.

Suppose we accept that the phenotypic and cultural variety is an intrinsic component of the central motor of the adaptive capacity of *Homo sapiens*. In that case, current world conditions constitute a flagrant transgression of said capacity by generating a society where a third of the population is practically in conditions of social immobility, homogenised by the deprivation of elementary conditions for its development or of those that would generate interest in accessing it. This constitutes an immoral and counter-evolutionary condition to the extent that it reduces the genetic and cultural pool.

It would seem that in addition to warmongers, the convergent dominance of corporate profit-seekers and captains of industry ring to the tune of "With God on our side…" (Bob Dylan).

Would our human species cease self-inflicting predatory activity? In this context, several domains should be considered beyond wars, e.g., infantile labour abuse, poverty rates, access to competitive levels of cognitive training, limited access to information sources and cognitive background for its interpretation, land and water ecosystems damage with impact on human populations, profit manipulation of information, infantile undernourishment, and commercial abuse of natural feeding resources.

As described in previous chapters, current political and corporative dominance are expressed as human, culturally deviant derivatives of ancestral animal behavioural survival drives stemming from dominance-based feeding and territorial and reproductive priorities. Besides territoriality, the above were replaced by wealth, material possessions, political and commercial power, cognitive-information empowerment, and social standing. The remaining two animal drives became subsidiary to the latter. The construction of social systems spins around the satisfaction of these goals backed by imposing intelligent propaganda or mystic drives. Hence, any attempt at future social change should focus on these domains to modify prevailing collective mental moulding, for current individual freedom runs through a conditioned path built since early individual developmental times and through collective informational channels.

Defusing the three-pronged menace to our species' survival on Earth – social unrest/inequalities, armed international tension/dominance prone, environmental/climate distress – would imply a widespread change of values prioritising social and ecological interest and rationality over dominance/profit-prone behaviour, real social solidarity policies, and fostering human-ecosystem equilibrium. Given current trends in each of these domains and the diverse cultural drivers acting on them, perspectives look rather sombre unless a wave of rationality and solidarity tilts the balance on *the evolutionary trap.* At this point, fantasy tends to cope with dreams of future deals and derive into privileged minorities scape solutions linked to power and caste dominance or fostering religious or mystic scenarios.

As stated in the Foreword, animal species' survival in natural history is based on what could be taken and defended, a simple equation that has been expanded and made exceedingly complex by human civilisation. This is due to its disparate composition and social strata regarding wealth, knowledge, cognitive development, cultural construction, and its abusive relationship with the ecosystem. Hence, in such a dynamic – and crackled – interactive context, assigning probability values to future survival estimates of socio-cultural components and values, or its possible outcome or evolution with time, would imply taking a high risk or an imaginative bias. Hypothetically unleashed scientific-technological developments and evolving *sapiens* varieties – as natural history has shown – would sum up additional factors in the complex, multifactorial equation of future human evolution.

In previous chapters, social, productive, wealth, aggression force potential and educational inequalities were shown to compose a crackled – non-integrated – world composition that nests different, competitive, ideological, and vested profit interests. The dynamics of such complex interactive factors – coupled with two main basic drives, dominance and survival – do not allow us to perceive a possible, viable, unique outcome for the human species. Perhaps paying for *the evolutionary trap* set up by an untamed ancient, historical natural survival profile. It would imply succumbing to our most cherished behavioural profiles – those that define us as being humans – in the hands of representatives of material or emotional dominance.

The Darwinian concept of *the survival of the fittest,* which had its roots in natural history, was later used to justify social theories based on human mental profiles and hierarchical (social, racial) constructions – biased by gross inequalities due to social prejudices and political/corporative profit-seeking priorities. As supported by abundant bibliography, proper early feeding and exposure to progressive educational means provide the grounds for optimal brain and mental development and performance, usually compromised under poverty or scant cognitive stimuli. While science and technology dwell on developing mind-breaking projects such as efforts to beam-in solar energy to Earth, similar levels of pursuit and investment should be placed on solving the ongoing human degradation process through unbalanced promotion and access to cognitive enhancement and individual development. Profound wealth inequalities and corruption are the sources of caste-like minorities' social dominance, planning and executing the world's future. Hence, placing proper priorities for shared human development seems to be the key to the pursuit of values to build a more humane civilisation. Otherwise, the existing gap will complete the crack of unwanted, social-generated, abysmal futures that will increase the current distortion of humanity's society.

Whether science will be Noah's ark for a wealthy elite – leaving the rest to drown – it represents a vision that minimises the dynamic experience of social processes in the history of civilisation. Although this potential access to scientific and technological developments represent a strong advantage – though shared by competitive foes – the remaining citizen's majority survival drive is perhaps one strong, basic, individual, and gregarious mover and behaviour modifier that has profiled natural history's series of events. Our species' future would seem to cling to it. We must incorporate to it a strong quality profile. As stated before, unless we hold to these ideas in an epic enterprise towards collective freedom of thought and expression and avoid human-against-human war conflicts, profit and wealth dominance, and profound inequalities, we will keep perverting our collective existence while allowing ancestral traits to obscure our species' creative potential and polychromatic capacities and expressions.

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Notes

1 https://www.education-progress.org/en; https://en.unesco.org/.
2 https://edition.cnn.com/specials/asia/thailand-cave-rescue.
3 "The Fermi paradox is the conflict between an expectation of a high *ex ante* (*from what might lie ahead*) probability of intelligent life elsewhere in the universe and the apparently lifeless universe we in fact observe. (Sandberg et al., 2018) (Text in italics by JAC).
4 https://estudioslibertarios.wordpress.com/2013/04/11/entrevista-eduardo-colombo-2013/.

APPENDIX

List of Wars (by Era[1])

- Prehistoric warfare
- Ancient warfare
  - Ancient Greek warfare
  - Aztec warfare
  - Celtic warfare
  - Dacian warfare
  - Endemic warfare
  - Gaelic warfare
  - Gothic and Vandal warfare
  - Illyrian warfare
  - Mayan warfare
  - Roman warfare
  - Thracian warfare
- Medieval warfare
  - Anglo-Saxon warfare
- Early modern warfare
  - Napoleonic warfare
- Industrial warfare
- Modern warfare

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TABLE 14 List of wars ordered chronologically by the year that hostilities were initiated according to *The Editors of Encyclopaedia Britannica. Edit History*

1300–1200 BCE

- Trojan War (dates uncertain)

1200–1100 BCE

- Trojan War (dates uncertain)

800–700 BCE

- First Messenian War (c. 735–715 BCE)
- Lelantine War (c. 720–680 BCE; dates uncertain)

700–600 BCE

- Lelantine War (c.720–680 BCE; dates uncertain)
- Second Messenian War (c. 660 BCE)

500–400 BCE

- Greco-Persian Wars (492–449 BCE)
- Peloponnesian War (431–404 BCE)

400–300 BCE

- Lamian War (323–322 BCE)

300–200 BCE

- First Punic War (264–241 BCE)
- Second Punic War (218–201 BCE)

200–100 BCE

- Third Punic War (149–146 BCE)

100 BCE–100 CE

- Gallic Wars (58–50 BCE)

600–700 CE

- Jinshin-no-ran (672)

1000–1300 CE

- Norman Conquest (1066)
- Crusades (1095–1291; sporadically thereafter)
- Gempei War (1180–85)
- Barons' War (1264–67)

1300–1400 CE

- Hundred Years' War (c. 1337–1453)
- War of the Eight Saints (1375–78)

1400–1500 CE

- Hundred Years' War (c. 1337–1453)
- Thirteen Years' War (1454–66)

(*Continued*)

Table 14 (*Continued*)

- Wars of the Roses (1455–85)
- Ōnin War (1467–77)

1500–1600 CE

- Count's War (1534–36)
- Araucanian Wars (1541–58)
- Livonian War (1558–83)
- Eighty Years' War (1568–1648)
- War of the Three Henrys (1587–89)

1600–1700 CE

- Eighty Years' War (1568–1648)
- Kalmar War (1611–13)
- Thirty Years' War (1618–48)
- Powhatan War (1622–44)
- Bishops' Wars (1639; 1640)
- English Civil Wars (1642–51)
- First Northern War (1655–60)
- War of Devolution (1667–68)
- King Philip's War (1675–76)
- War of the Grand Alliance (1689–97)
- King William's War (1689–97)

1700–1800 CE

- Second Northern War (1700–21)
- War of the Spanish Succession (1701–14)
- War of the Emboabas (1708–09)
- Carnatic Wars (1746–48; 1749–54; 1758–63)
- Queen Anne's War (1702–13)
- Yamasee War (1715–16)
- War of the Polish Succession (1733–38)
- War of Jenkins' Ear (1739–48)
- War of the Austrian Succession (1740–48)
- King George's War (1744–48)
- French and Indian War (1754–63)
- Silesian Wars (1740–42; 1744–45; 1756–62)
- Seven Years' War (1756–63)
- Lord Dunmore's War (1774)
- Rohilla War (1774)
- American Revolution (1775–83)
- First Maratha War (1775–82)
- War of the Bavarian Succession (1778–79)
- Cape Frontier Wars (1779–1879)
- French Revolution (1787–99)
- French revolutionary wars (1792–1801)

1800–1900 CE

- Cape Frontier Wars (1779–1879)
- French revolutionary wars (1792–1801)

(*Continued*)

Table 14 (*Continued*)

- War of the Oranges (1801)
- Tripolitan War (1801–05)
- Second Maratha War (1803–05)
- Third Maratha War (1817–18)
- Napoleonic Wars (1803–15)
- Black War (1804–30)
- Peninsular War (1808–14)
- War of 1812 (1812–15)
- Creek War (1813–14)
- War of Greek Independence (1821–32)
- Padri War (1821–37)
- Naning War (1831–32)
- Pastry War (1838–39)
- Mexican-American War (1846–48)
- Crimean War (1853–56)
- Bleeding Kansas (1854–59)
- American Civil War (1861–65)
- War of the Triple Alliance (1864/65–70)
- Seven Weeks' War (1866)
- Selangor Civil War (1867–73)
- Franco-German War (1870–71)
- Acehnese War (1873–1904)
- Red River Indian War (1874–75)
- Serbo-Turkish War (1876–78)
- Anglo-Zulu War (1879)
- War of the Pacific (1879–83)
- Gun War (1880–81)
- Sino-French War (1883–85)
- Serbo-Bulgarian War (1885–86)
- Sino-Japanese War (1894–95)
- Spanish-American War (1898)
- Philippine-American War (1899–1902)
- South African War (1899–1902)
- The War of a Thousand Days (1899–1903)

1900–2000 CE

- Acehnese War (1873–1904)
- Philippine-American War (1899–1902)
- South African War (1899–1902)
- The War of a Thousand Days (1899–1903)
- Boxer Rebellion (1900–01)
- Moro Wars (1901–13)
- Russo-Japanese War (1904–05)
- Pig War (1906–09)
- Mexican Revolution (1910–20)
- Italo-Turkish War (1911–12)
- World War I (1914–18)
- Baltic War of Liberation (1918–20)

(*Continued*)

Table 14 (*Continued*)

- Russian Civil War (1918–20)
- Russo-Polish War (1919–20)
- Rif War (1921–26)
- Chaco War (1932–35)
- Italo-Ethiopian War (1935–36)
- Spanish Civil War (1936–39)
- Sino-Japanese War (1937–45)
- Phoney War (1939–40; no actual hostilities)
- Russo-Finnish War (1939–40)
- World War II (1939–45)
- Greek Civil War (1944–45; 1946–49)
- Arab-Israeli wars (1948–49; 1956; 1967; 1973; 1982)
- Korean War (1950–53)
- Algerian War (1954–62)
- Vietnam War (1954–75)
- Six-Day War (1967)
- War of Attrition (1969–70)
- Yom Kippur War (1973)
- Dirty War (1976–83)
- Afghan War (1978–92)
- Iran-Iraq War (1980–88)
- Falkland Islands War (1982)
- Persian Gulf War (1990–91)
- Bosnian conflict (1992–95)
- Kosovo conflict (1998–99)
- Second Congo War (1998–2003)

2000– ...CE

- Afghanistan War (2001–14)
- Iraq War (2003–11),
- Iraq Civil War (2013–17)
- Syrian Civil War (2011–22)
- Yemeni Civil War (2014–)
- Russian-Ukrainian War (2014–)

https://www.britannica.com/topic/list-of-wars-2031197) (*Italics* added by JAC 2022).

*

An additional listing of wars by predominant nations in modern times (post World War I) can be found in:

https://en.wikipedia.org/wiki/Foreign_interventions_by_the_United_States
https://en.wikipedia.org/wiki/Military_history_of_the_United_Kingdom
https://www.theguardian.com/uk-news/ng-interactive/2014/feb/11/britain-100-years-of-conflict
https://en.wikipedia.org/wiki/List_of_wars_involving_Spain
https://en.wikipedia.org/wiki/List_of_wars_involving_France

https://en.wikipedia.org/wiki/List_of_wars_involving_Russia
https://en.wikipedia.org/wiki/List_of_wars_involving_Italy

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Civil Unrest on the Rise

The 2020 Global Peace Index data show that civil unrest has doubled over the last decade**. Between 2011 and 2018, the number of protests and riots roughly doubled**, while the number of general strikes quadrupled – from 33 in 2011 to 135 in 2018, as shown in the following graph (Figure 56).[2]

***

TABLE 15 Ongoing armed conflicts

2011	Yemeni Crisis • Yemeni Civil War (2014–present) • Al-Qaeda insurgency in Yemen • Houthi–Saudi Arabian conflict • Saudi Arabian–led intervention in Yemen	Asia (Arabian Peninsula)
2014	Russo-Ukrainian War • War in Donbas • 2022 Russian invasion of Ukraine	*Europe*
2020	Tigray War • Spillover of the Tigray War • 2020–22 Ethiopian–Sudanese clashes	Africa

Note: https://en.wikipedia.org/wiki/List_of_ongoing_armed_conflicts

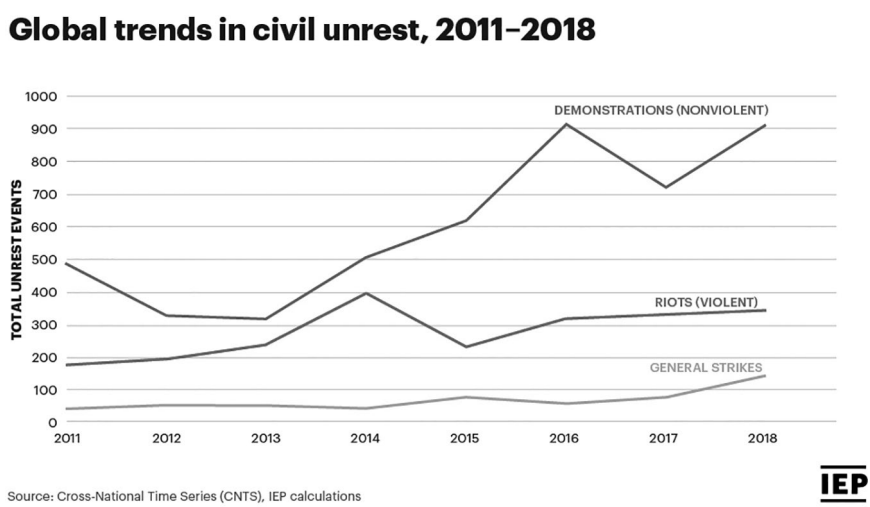

FIGURE 56 Number of civil unrest events between 2011 and 2018.

Notes

1 https://en.wikipedia.org/wiki/Prehistoric_warfare.
2 https://www.visionofhumanity.org/wp-content/uploads/2020/10/GPI_2020_web.pdf.

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