THE INVENTION OF GOOD AND EVIL

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A World History of Morality

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Introduction

Let me tell you a story. Will we, once it is done, still feel the same way about ourselves?

It's a long story, and it's about everything that has ever been important to us: our values, our principles, the roots of our identity, the foundations of our coexistence. It's about working with each other and against each other; it's about being on the side judging or the side being judged; and it's about which of these two sides we'll find ourselves on tomorrow.

The story I want to tell is a history of morality. What gives us our bearings? How do we want to live? How can we get along with each other? How did we manage in the past, and how will it be possible in the future? These are all moral questions. Morality can make us think of any number of things: restraint and coercion; restriction and sacrifice; inquisition, confession and guilty conscience; chastity and catechism. For many, it is a concept that feels joyless, claustrophobic, an admonishing finger to shame us into compliance.

And this impression is not necessarily incorrect. But it is most certainly incomplete, just one part of the picture that needs to be filled in. This story will trace humanity's fundamental moral transformations, from our earliest, not-yet-human ancestors in East Africa to the conflicts over identity, inequality and oppression that are all being played out online from today's global metropolises. It explains how our human society has changed through the ages, how new institutions, technologies, knowledge and economic forms have developed in parallel with

our values and norms, and delves into the fact that each of these changes has more than one side: anyone who lives in a community excludes others; anyone who understands rules wants to monitor them; anyone who trusts becomes dependent; anyone who generates wealth creates inequality and exploitation.

Every change or welcome development has a hard, dark, cold side and every advancement comes at a cost. Our early evolution millennia ago made us cooperative, but it also made us hostile to anyone who did not belong to our group – once we learned how to say 'us', we also needed to be able to say 'them'. The development of punishment was a form of self-domestication and made us friendly and peaceable, but it also gave us powerful punitive instincts that we would use to monitor compliance with our rules. Culture and learning gave us new knowledge and new skills that we learned from others – and consequently made us dependent on those others. The emergence of inequality and domination brought unprecedented wealth, but, alongside that, hierarchy and oppression surfaced. Modernity set individuals free to bring nature under control with science and technology; in the process, we explained away all the magic and disenchanted our world, as Max Weber put it, and uprooted ourselves from tradition and community, and created the conditions for colonialism and slavery. The twentieth century's aim was to create a peaceful society with the help of global institutions, a society where everyone would enjoy the same moral status, but it brought us some of the most breath-taking crimes in human history and has manoeuvred us to the brink of ecological collapse. Recently we have been trying to finally cast off racism, sexism, homophobia and exclusion. There will be unforeseen aftereffects of this progress too, but it will be worth it.

Our morality is a palimpsest: a parchment that's been written over time after time, often illegible and difficult to decipher. But what is morality? How can we define it? It may be better not to: as Nietzsche wrote, 'It is only that which has

no history which can be defined.'[1] However, our morality does have a history, and it is too complex and unwieldy for the sterile formulas we come up with in our armchairs. But the fact that we have difficulty defining what morality is does not mean it's impossible to say what it is with any clarity. It's just that it can't be said *concisely*.

A history of morality is not a history of moral *philosophy*. We have been thinking about our values for a long time, but it's only in recent times that we have been writing down our thoughts. The Code of Hammurabi and the Ten Commandments, the Sermon on the Mount, Kant's categorical imperative and Rawls's veil of ignorance all play a part in this story, but only a comparatively minor one. This is the much bigger history of our values, norms, institutions and practices. Our morality is not in our heads, but in our cities and walls, laws and customs, in our rituals and wars.

As well as helping us understand the past, this long history of morality will also, I hope, contribute to our understanding of the present. Modern societies are currently under moral pressure to reconcile the prospect of their own existence with the most unpleasant truths of their origins. How can we map out the ongoing changes to our moral infrastructure in a way that makes 'light dawn gradually over the whole'?[2] Where did the dynamic of polarisation we are now witnessing come from? What is the relationship between cultural identity and social inequality? To understand the present, we have to turn to the past.

Over the course of this book, we will go on a journey together to chart the evolution of our morality. It made us capable of cooperation, but confined our moral dispositions to those we consider to be from within 'our' group (Chapter 1: 5,000,000 Years). The need for cooperation grew as a result of external environmental changes, which required individuals living together in larger and larger groups. On the one hand, developing and using punishment gave us the self-control

and social tolerance essential for this, but on the other hand, it endowed us with a punitive psychology that would be used with the utmost vigilance to monitor compliance with our group's norms (Chapter 2: 500,000 Years). The dual inheritance of genes and culture turned us into beings who would depend on learning from others to be able to best absorb the accumulated cultural capital of information and skills from previous generations. At the same time, it became essential to be able to decide from whom we would like to learn – in other words, whom to trust and believe – and it would be shared values that would bring about this trust (Chapter 3: 50,000 Years).

This species of cooperative, punitive and socially learning beings ultimately managed to build ever larger societies – which threatened to collapse under the pressure of their own headcounts. Strictly hierarchical forms of organisation began to replace our original egalitarianism, in order to contend with this pressure, as a result of which human societies split into groups: socio-economic elites and a majority of politically and materially disadvantaged people. Social inequality grew, as did, conversely, our aversion to it (Chapter 4: 5,000 Years).

It was only a matter of time before the historical evolution of morality produced a cultural situation that replaced kinship and hierarchy with cooperative relationships which were voluntarily entered into between individuals, as structural principles of society. This new stage of social evolution unleashed unprecedented forces of economic growth, scientific progress and political emancipation, which resulted in the modern society in which we live today (Chapter 5: 500 Years). At the same time, tensions have mounted between our psychological aversions to social inequality and the economic advantages made possible by a social structure based on individual liberties. With increasing material abundance, the demand to finally realise the promise of human equality grew more vocal: the socio-political status of disadvantaged minorities became a moral priority (Chapter 6: 50 Years). The fact that this problem could not be solved as

quickly as we had hoped characterises our current situation, with the main elements of the history of our morality combining into a toxic mixture: our morally charged group psychology makes us receptive to social division.

The difficulties in overcoming the remaining social inequalities have led to suspicion of anyone who isn't fighting for the same cause with the vehemence we perceive as necessary. This reinforces the division of society into 'us' and 'them', which in turn increases our susceptibility to disinformation as we become increasingly dependent on signals of moral belonging when we make decisions about who to believe. Our punitive psychology is now beginning to scrutinise the symbolic markers of our group membership more and more closely and to penalise any non-compliance with the norms in question more and more excessively. The identity conflicts of the present day – both left- and right-wing – are the result of this dynamic (Chapter 7: 5 Years). Today, our political disagreements may feel like the end of the world, but where will the evolution of morality take us next? It doesn't have to end like this: after all, we all share the same history of morality; our political disagreements are often shallow; underneath them are deep-seated, universal moral values that all people share with each other, and that can be the basis for a new understanding (Conclusion).

This story is a long one which starts aeons ago and ends in the future. Its tempo will increase and intensify. Millions of years pass from the first chapter to the second, while the last three span only a few hundred between them. The chronological arrangement I've chosen shouldn't be taken too literally; after all, many of the developments overlap or aren't clearly attributable to specific times. The sections of time that organise the narrative should be interpreted just as ballpark figures that are intended to bring out the main points and provide an overview.

Other divisions might have been possible, and may even have been more useful. We could tell the story of our morality

as the story of growing human societies: from small family alliances with maybe five members to the first clans and tribes of 50 or 500, early cities with 5,000 or 50,000 inhabitants to our modern large societies with 5 billion people or more. The history of morality is also a history of various forms of human evolution. It begins with the mechanisms of biological evolution, with our morality contributing to the kind of creatures we became, and how we are designed as a natural species; it traces the forms of cultural evolution we used to create our own world; and it traces the outline of social and political evolution that shaped our current moment in human history.

Or I could have told a history of the fundamental elements of our moral infrastructure, in which our ability to cooperate, our propensity for punishment, trust in and dependence on others, equality and hierarchy, individuality and autonomy, vulnerability, belonging and identity combine to form our particular human way of life. The segmentation I've chosen here is a map, and a map is intended to provide orientation, not to depict reality. The most accurate map isn't always the most useful.

Each chapter builds on the previous one and continues the inner logic of the narrative. Yet each section is written so it also stands on its own and can be read separately from the others. If you're interested in humankind's biological evolution and how our morality shaped us as a species, you can focus on the first chapters. If you want to learn about humanity's early cultural history and about how the moral infrastructure of the first civilisations shaped this culture, you'll benefit most from the middle chapters. The last chapters are aimed primarily at anyone who wants to have a better understanding of the current moral zeitgeist. And anyone who – like me – believes that the best understanding of the present can be obtained from an understanding of the past should read the book in its entirety.

It is, in many ways, a pessimistic story of progress. Pessimistic because *within* every generation there is too much evil. But

it *is* a story of progress because there seem to be mechanisms *between* the generations that have the potential gradually to improve human morality, and because this potential is sometimes drawn upon. Moral progress is always possible and often tangible. But it doesn't happen as a matter of course: every achievement has to be defended from the regressive forces of a stubborn human nature, the irrationalities of the human psyche and the mercilessness of fate.

The idea that we can only understand our morality, with its puzzles and contradictions, if we understand its origin isn't new. Friedrich Nietzsche first referred to this project as 'genealogy', in the style of ancestral research. We can use this approach to ask about the origins of morality. To get there, we must go much further back than Nietzsche himself thought necessary, not just focusing on the shift from the worldly, aristocratic and heroic ethics of antiquity to the Christian early Middle Ages, when the values of compassion and humility, sin, renunciation and the afterlife began to be emphasised. Instead, we need to look at the much more fundamental problem of how our human sense of morality came into being in the first place. Only then can we understand how our values and the social structures that embody these values have been able to change over time.

The history of morality that I have to offer is not a history in the traditional sense, referring to concrete events and developments that may or may not be well documented. It is, instead, a 'deep history' that doesn't use dates or names, sketching out instead a feasible scenario that could have gone along these lines. It will never be possible to fully decipher the precise course of events: deep is the well of the past (and maybe even bottomless). We have to rely on the best possible triangulation of various different disciplines. Genetics, palaeontology, psychology and cognitive sciences, primatology and anthropology, philosophy and evolutionary theory each provide their own perspectives that combine to form a picture.

Will this story bring to light the *pudenda origo* of our values,

as Nietzsche believed – their shameful origin? Will we still feel the same way about ourselves when it's over? In the cold light of day, will the uncomfortable truth shatter our confidence in our values? Will it show that our morality can stand up to closer scrutiny? Or will it all end in devastation and hatred and shame?

We have no way of knowing what the future holds, how we will all live together, and how we'd like to. And we don't have to know. Our moral values are like headlights: they don't help us see very far, but if we rely on them, we can go on a long journey. This is the story of that journey.

And it starts like this:

1

5,000,000 YEARS

Genealogy 2.0

Descent

The trees vanished with the drought, and as cracks emerged, the land formed deep valleys and rugged canyons, giant dark lakes and bogs, tall mountains and low hills. Thorny bushes, shrubs and fine grasses soon appeared in place of the ample forests that had once offered protection among the vines, giant ferns laden with dew and lush succulents, where aromatic mushrooms with caps like bright flowers grew between the roots peeking out of the ground.

After we had left the trees and the trees had left us, only open plains awaited. In this new, boundless world, stones and fire rained from the sky, and there was little to eat. But there were large animals with fierce jaws that were faster than us, and just as hungry.

A shopping trolley half full of fossilised bones[1] is all that remains of our earliest ancestors, or at any rate, all that has ever been found. A few teeth, skull fragments, remnants of eyebrow ridges, sections of lower and upper jaws, splinters from a few thigh bones remain to tell the story of these forebears.

The terminology in this specialised area is confusing. Today researchers distinguish between various *taxa* (from the Ancient Greek *taxis*, 'arrangement'), depending on which branch of the zoological family tree they might be looking at and which differences and evolutionary offshoots they choose to emphasise: the *Hominidae* family includes all anthropoid apes, meaning

not only the various species of the *Homo* genus, but also gorillas, orang-utans and panins, whose most recent representatives are chimpanzees and bonobos. The term *Homininae*, on the other hand, does not include the *Ponginae* of Asia (orang-utans) but is reserved for African great apes, which covers, alongside humans, only panins and gorillas. Lastly, the term *Hominini* encompasses all humans in a narrower – though not yet the narrowest – sense. This tribe encompasses the earliest human-like (although admittedly not yet very recognisably human) animals that began to populate parts of southern and eastern Africa about 5 million years ago, a series of australopithecines grouped under various more familiar categories such as *Homo ergaster*, *Homo erectus*, *Homo heidelbergensis* and *Homo neanderthalensis*. Of these *Hominini*, only we, *Homo sapiens*, remain today.

Cooperation

The evolutionary history of the first *Hominini* is the history of our earliest protohuman forebears after splitting off from the ancestor we share with the other anthropoid apes that are still around today. This critical first phase of our evolution can be narrowed down to a time about 5 million years ago.[2]

The surviving fossils – with the exception of *Sahelanthropus tchadensis*, the oldest, whose asymmetrically shaped skull was discovered at the Toros-Menalla excavation site in the arid Djurab Desert in northern Chad – are found mainly in eastern Africa, in present-day Ethiopia, Kenya and Tanzania. Thigh fragments and a thumb bone of *Orrorin tugenensis* were found in the Lukeino Formation in the verdant Tugen hills; the back molars of *Ardipithecus ramidus* and the lower jaw of *Australopithecus afarensis* (the species to which 'Lucy' belongs) on the Awash River in the Afar Triangle. The second main concentration of fossil discoveries from roughly the same time period is in South Africa, where the remains of various human ancestors were found in the caves of Sterkfontein and Gladysvale,

Drimolen and Malapa. It is not unlikely that we owe these discoveries, these evolutionary messages in a bottle, to leopards and other large predators that lived in caves like these and are known to have carried their prey back to their dens to eat.

Today, our fossilised remnants are scattered all over the world in palaeoanthropological research institutes, where they have been assigned bureaucratic labels, marked down in files, archived, registered and made distinguishable from each other: *Sahelanthropus tchadensis* is known very prosaically as TM 266, O*rrorin tugenensis* as BAR 1000'00; other splinters, fragments and pieces are catalogued as Stw 573, KT-12/H1 or LH4. *Ardipithecus ramidus* is known as 'Ardi' – not very original, but at least it's a start.[3]

The story of human emergence that these discoveries can tell us is only tentative. It remains, as philosophers sometimes say, 'hostage to empirical data', and is at risk of being revised, corrected or superseded at any moment by new discoveries. And this is as it should be: only dogmas remain unchanged, and only in exceptional cases does science have room for ever-lasting knowledge. Our insight into our most remote past remains forever speculative, not in the nebulous sense of being unverifiable and far-fetched, but more practically: legions of brilliant minds, armed with the most sophisticated methods of comparative morphology, molecular genetics, radiocarbon dating, biochemistry, statistics and geology, attempting to reconstruct the most plausible version of this story from many heterogeneous theories and data sets. This work of reconstruction remains dependent on which of its secrets the Earth's crust has decided to reveal to us through random geological chance: we might often seem like the drunk searching for the keys he's lost on his way home, who, when asked why he's looking under the streetlight, replies that the light's better there.

We may have pinpointed the cradle of humanity as being in East Africa because the geological conditions there revealed layers of rock that in other places remained buried under dozens

of metres of stone, sand and clay. Added to this, as in all scientific disciplines, is an incentive structure that leads even the most serious researchers to tend to identify their latest finds as belonging to our ancestors and not to what we feel are more mundane species: astonishingly, there are virtually no fossils of chimpanzees or bonobos, although of course, 'no one has been anxious to forgo the chance of being the discoverer of the earliest hominin in favour of being the discoverer of the earliest panin'.[4]

When we talk about our earliest human ancestors, who followed immediately after the evolutionary branching off from the rest of the anthropoid apes, we are talking about animals whose physiognomy and appearance are only very remotely reminiscent of modern humans. Barely over a metre tall, with extra-long arms characteristic of primates, protruding snouts, dilated nostrils and their entire bodies covered with thick brown-black fur, these protohumans resembled today's apes more than they did us. The first signs of culture and intelligent problem solving are not visible until much later: the primitive stone tools that made the Olduvai Gorge in Tanzania famous are at most 2.5 million years old.

It was warm at that point, but not too warm, as our habitat was often at altitudes above 1,000 metres. In these open, loosely wooded grasslands, we spent our days in small groups searching the ground for roots and tubers, bitter shoots and gnarled rhizomes, nuts and termites, and if we were lucky, we found the remains of animals left behind by hyenas or lions – far more talented hunters than we were at that time. Dried remains of meat from their carcasses provided us with protein, as did the marrow from their bones and their brains, which we scooped out of their smashed skulls with nimble fingers.

Two million years ago, the Pleistocene began: one of the crucial geological eras for human evolution. The Earth was populated by bizarre megafauna – mammoths, woolly rhinoceroses, sabre-toothed tigers and giant armadillos roamed the land. They

are now all extinct, partly because of us. We lived in a harsh, dangerous world. The open, savannah-like expanses that had formed along the African Great Rift Valley and reshaped the eastern part of the continent made us vulnerable to predators: in this exposed landscape we could no longer protect ourselves by fleeing quickly into the treetops. The mountain ranges that had begun to form in the west cut these plains off from the wind and rain that would otherwise have come in from the Atlantic Ocean and provided water for the Earth.[5]

The Laetoli footprints, preserved and handed down to us almost 4 million years ago by ash from the Sadiman volcano in northern Tanzania, commemorate a family – two adults and a child. They are the oldest tangible evidence of human life walking upright. The new living conditions away from dense forests contributed to this two-legged way of life. Although we remained competent climbers for a long time to come, we were increasingly dependent on the ability to cover longer distances on foot. On these flat, wide plains, it was worthwhile to develop a faster gait and to take in an overview of our surroundings.

Time-budgeting models formulated only very recently give us an insight into the social life of this group of early hominins.[6] In order to survive in our environment, we primates (and other living creatures) ultimately had to do three things: obtain food, pause to rest and maintain social cohesion. Once we have a rough idea of what the archaic environment was like at a given time and we can roughly estimate how many hours of daylight were available to a given species, we can start to gauge the maximum size of the groups, whose cohesion was maintained by what is known as grooming – the reciprocal hair- and skincare that is the key mechanism for establishing social solidarity among primates. If they had to spend this many hours searching for food and that many hours resting, they had a maximum of x hours left to attend to the cohesion of the group. This window of time wasn't enough to maintain groups of over twenty members.

But why was social life so important to our ancestors? Why did our ability to cooperate take on such an important role?

Humanity's first fundamental moral transformation was the discovery of morality in the first place. Most animal species have behavioural norms that enable and facilitate a group's cohesion. Schools of fish, whose movements seem to follow a ghostly, unheard rhythm, cooperate through conformity; social insects such as bees or ants have perfected a division of labour that often demands complete self-sacrifice from the individual for the good of the hive or colony. The special form of cooperation that has shaped human morality consists of putting aside the interests of the individual in favour of a greater common good from which everyone can benefit.

The emergence of human cooperation was the first crucial moral transformation of our species. Why cooperation? The evolution of our unique ability to cooperate can be traced back to climatic and geographical changes that resulted in tropical forests giving way to more open, savannah-like spaces. This also explains why our way of life is so dramatically different from that of chimpanzees and bonobos. Our closest relatives, who were spared climatic upheavals like these, continued to live in densely forested areas around the Congo River in Central Africa, and as a result were exposed to completely different selection pressures. The destabilisation of our environment, and the fact that we were far more drastically exposed to being preyed upon by dangerous predators, increased the pressure to compensate for this new vulnerability with better means of mutual defence. We found support and strength in larger groups with closer cooperation. We humans are what becomes of the most intelligent apes if they're forced to live in large swathes of open grassland for 5 million years.[7]

Adaptation

Evolutionary psychology seeks to find out something about the present from our evolutionary history. It has a bad reputation: to many, it appears to be a clumsily disguised pseudo-scientific attempt to legitimise reactionary prejudices. This accusation is not entirely unfounded, and the study of gender differences, in particular, tempts some theorists to come up with often outrageous 'just-so stories'. These practically impossible to verify but seemingly plausible versions of our evolutionary prehistory supposedly explain why women like buying shoes and men like watching football: as the gatherer of fruits and berries, the archetypal woman has always been keen to go in search of small, colourful objects to bring home. Conversely, men, who have always been engaged in hunting, naturally have an endless fascination for physical competition, having a target, fighting and defeating their opponent. The theory goes that it still follows today for the man to bring the prey home to feed his family, and for the woman in return to ensure she always looks pretty.

Accusing evolutionary psychology of chauvinism is therefore not entirely unjustified. Nonetheless, the fact that half a discipline is sexist bullshit doesn't necessarily mean the other half is just as untrustworthy. It is undeniable that evolution has shaped our psyches, just as it shaped our bodies. It would be astounding – maybe even disturbing and enigmatic – if natural selection had left its mark only from our necks down. Evolutionary psychology seeks to use evolutionary theory in its approach to psychology. Its aim is to find out whether and to what extent our evolutionary journey has influenced the way we think, feel, perceive and act, to be able to learn from our past for our present.

A significant part of this is understanding the environmental conditions in which this evolution has taken place. It's no coincidence that we fear snakes and spiders, build parks resembling savannah landscapes in our cities, appreciate a campfire, spend hours gossiping about other people, have the ability to

throw something at a target or run long distances, or become frightened by sudden loud noises. Our visual perception is sensitised to only one part of the electromagnetic spectrum – namely the part that is biologically advantageous to be able to see (we call it 'light'). The assumption is that other traits of our psychology are similar. Our minds still work in line with patterns that were once a competitive advantage for our ancestors. A trait that offers an advantage like this as a result of adaptation is called 'adaptive'. Not all our abilities are necessarily of evolutionary origin, but functionally complex characteristics are very likely to be adaptive – or at least once were adaptive.

One of the most interesting consequences of evolutionary psychology is that it can explain many modern-day malfunctions in our thinking and behaviour. Probably the best-known example of this mismatch between mind and environment is our almost unlimited appetite for sugar. Carbohydrates are an important source of energy for the human body, and in the past energy was usually one thing: scarce. So it made sense for us to have inherited an evolutionary disposition that ensured we would never miss an opportunity to consume sugar. For as long as carbohydrates are scarce, this disposition remains adaptive, as our desire for sugar effectively motivates us to absorb a significant source of energy. But the moment we leave our environment of evolutionary adaptation and have permanent access to unlimited supplies of sugar through supermarkets and petrol stations, our desire becomes a problem: from that moment on, the evolutionary imperative to consume as much energy as possible in preparation for leaner times needs to be consciously reined in.

Unfortunately, modern societies represent an increasingly hostile environment for our psychology, which is endowed with a whole arsenal of atavistic tendencies, and we constantly have to make great efforts to suppress our primeval instincts, patterns of thought and behaviour. This increases the need for self-control and gradually leads to a diffuse 'discontent'[8] in

civilisation, because it eliminates our material hardship whilst making greater demands on our cognitive discipline. This perpetuates a paradoxical perception: developed human societies' material prosperity seems to be a promise of happiness that is frustratingly slowly – and never fully – fulfilled, because we pay for every increase in social complexity with an increase in cognitive overload.

For a history of morality, what matters is which attributes of our evolutionary past have shaped the nature and extent of our willingness to cooperate. We know that we have an unusually spontaneous and surprisingly flexible capacity for cooperation. But why?

The crucial phase of our specifically human evolution – the evolutionary prehistory that we do not have in common with amoebae, amphibians or other mammals – took place in a highly volatile environment. That's not to say that the weather at that time was particularly unpredictable, but that our ancestors' populations had to deal with rapid and drastic climate changes over generations: upheavals that would ordinarily have been slower or less extreme, or both. An unstable natural environment puts a premium on increased flexibility and adaptability in terms of food, mobility and settlement. These qualities meant our ancestors could explore new habitats without first having to undergo anatomical changes. Early technological breakthroughs ensured we could cope better with nature's demands and survive new niche conditions. An increasingly volatile environment also meant it made sense to share risks. The knowledge that three out of twenty huts fall victim to storms every year, but not knowing whose hut might be hit this year, made it worthwhile for social structures to have in-built security systems that would provisionally protect a group's members from the vagaries of fate.

The presence of larger mammal species made hunting in groups adaptive, too. Many animals hunt together, but the level of precision and coordination displayed by humanity is

unrivalled. At some point, our ancestors became increasingly dependent on being able to get a steady supply of meat from large animals. This made it worthwhile in terms of evolution to develop collective intentions – known as 'we-intentions'[9] – to learn the complex art of hunting and ultimately to carry it out in groups with others. Sophisticated institutions that regulated hunting, as well as the sharing of spoils, began to develop at the same time.

As a result, the cooperative beings that we had become could reap the fruits of the teamwork provided by our natural or social environment. This resulted in economies of scale: the benefits of cooperation actually increased with growing co-operative networks. This phenomenon, which economists call 'increasing returns to scale', means that our achievements do not always develop in a linear way, but can sometimes suddenly explode. If you can only hunt an elephant or a zebra in groups of at least six, choosing between hunting in groups of five and hunting in groups of six doesn't just mean choosing between five and six rabbits, but between five rabbits and one elephant.

The 'stag hunt' is a theoretical model that can be used to demonstrate this form of cooperation. In this assurance game, there are two players (A and B) and two options (stag or hare hunting). The stag can only be killed by the players together; anyone can catch a hare by themselves. It is vital that the players *coordinate* what they do. If A hunts stags and B hunts hares, A goes home hungry and B with a missed opportunity. Only when both decide to hunt stags is the optimum result achieved.

In our environment of evolutionary adaptation, we lived in small groups. A key concept in evolutionary anthropology is 'Dunbar's number'. The British evolutionary psychologist Robin Dunbar was able to prove that there was a correlation between the size of a primate's neocortex and the upper limit to the number of members in their group, as larger groups with correspondingly more complex social structures place increased demands on our ability to process information.[10] We had to

decide who to trust and we had to keep our mental records of their social reputations up to date if we were going to be able to gauge who was a good friend, who was a good teacher and who was both, who was best at hunting, cooking or following tracks, or who offended whom, when and how much.

The growing size of a community is destabilising in the long run, because we naturally lack the institutional tools to make cooperative arrangements permanently resilient. Dunbar even stated that for modern human populations, based on their average cerebral volume, their natural group size can be narrowed down relatively precisely to 150 people. This figure can be found in a wide variety of contexts, ranging from tribal societies to the internal structures of military forms of organisation. To put it bluntly, there are 150 people at most you would happily join for a drink in a bar.[11] What makes human societies special is, of course, that they can integrate far more than 150 people. However, this has only been able to happen recently, and it depends on an institutional framework that cooperatively regulates the formation of larger groups. Communities that emerge spontaneously split up as soon as their numerical load-bearing capacity is overstretched.

The small groups in which our evolutionary ancestors were designed to live were in a state of permanent, or at least latent, conflict. For one thing, under the unpredictable environmental conditions in our evolutionary past, there were often fierce conflicts over scarce natural resources. Whether we can describe man as a 'wolf to man' (or, in other words, man as man's own predator), as Thomas Hobbes did, remains a controversial question, but the fact that human groups were usually extremely hostile to each other can clearly be demonstrated by data from forensic archaeology.[12] In some tribes of nomadic hunter-gatherers, it is even said that the concept of a natural death not violently brought about by the members of a neighbouring tribe was more or less unknown.

It's not surprising that ancient groups converging must

usually have led to violent conflict. In terms of evolution, it makes sense to expect territorial warfare and clashes over resources, as group conflicts are ideally suited to increasing the selection pressure on cooperative mechanisms.[13] The more an individual's survival depends on the group's success, the more altruistic actions for the benefit of the collective begin to pay off. Many people are reluctant to cite warfare as an example of altruistic cooperation, but technically speaking, it is the case: anyone who fights along with others gives a common project precedence over their own interest, and in doing so, they choose the cooperative option.[14] Whether the war is won or lost, that individual's own contribution is virtually always negligible. The fruits of victory are also enjoyed by objectors to the conflict itself. As a result, wars are classic collective action problems. Whether or not the acts of war serve a morally good cause is secondary: cooperation is a key element in human morality, even when we're talking about cooperating for the benefit of evil intentions.

Outbreaks of violence probably occurred both through chance encounters and, above all, through strategic raids between hostile groups. The volatile climate mentioned earlier would only have made these more common, as the frequent upheavals caused by migration made previously isolated groups all the more likely to clash. Ethnographic surveys of recent indigenous populations paint the same picture. Inwardly, our ancestors were family-centric pacifists, but outwardly, they were gangs of murderers and plunderers.

The setting for our evolutionary adaptation is not a specific place we can circle on a map of the world, nor a historical period that can be marked on a timeline. Our evolutionary past is a collective term encompassing the range of natural and social conditions that have applied effective selection pressure on our species' development. If we want to understand our morality, we need to understand the history of this selection.

Biological evolution

To gain a better understanding of the mechanisms of human evolution, we first need to get to grips with how evolution works in general. As late as 1790, Kant considered it 'absurd' and therefore simply impossible 'to hope that another Newton will arise in the future, who shall make comprehensible by us the production of a blade of grass'.[15] Charles Darwin's O*n the* O*rigin of Species* would appear just sixty-nine years later, once again proving that what may seem impossible one day can be reality the next.

The impression that the living world might be the result of deliberate intervention is irresistible, at first glance. Our eyes are there to see, the heart to pump. Cheetahs are streamlined and fast *so that* they can hunt well. Birds can fly, *so that* . . . and so on. The theory of evolution does away with this impression and exposes it as a teleological illusion. Life is only seemingly purpose-driven; it actually follows the haphazard tide of mutation and selection.

In fact, the semblance of intelligent design is due to a gradual process during which the frequency of variants changed over millions and millions of years under external selection pressure (as a result of epidemics or climate change, for example). Evolution always takes place wherever there is 'descent with modification', as Darwin put it. It is based on a combination of several factors such as variation, differing degrees of reproductive success and inheritance. Random mutations provide variation. Differences in the relative reproductive successes of the resulting variants lead to fresh mixes in the next generation through inheritance. This process is called natural selection.

All this happens 'blindly' – in other words it is 'unplanned' in this context. No one is in charge of the process, which progresses 'algorithmically', as the philosopher Daniel Dennett notes.[16] An algorithm is a decision-making procedure that, when applied correctly and repeatedly, mechanically produces a certain result. Evolution produces adaptation – and, in the long

run, the emergence of new species (speciation) – by repeatedly applying variation and selection.

Natural selection is not the only mechanism that determines the composition of a population. As well as random genetic drift, sexual selection also plays a part. Whether or not sexual selection is a variety of natural selection is a controversial question, though. In the process of sexual selection, an organism's reproductive success (or more precisely, the success of its genes) doesn't depend on the laws of nature, but on the opposite sex's capricious tastes.

There are probably few scientific concepts that seem as easy to understand and are yet so often misunderstood. The concept of adaptation may prompt the Lamarckian misconception that environmental influences can lead to phenotypic changes in existing organisms. For example, evolution would mean that a giraffe's neck grows longer from trying to reach the leaves from particularly tall treetops. This is contradicted both by the fact that acquired characteristics (apart from a few epigenetic exceptions) are not hereditary and by the fact that certain characteristics cannot be acquired in the first place. An even more fundamental misunderstanding, though, is assuming that evolution is a process that takes place in individuals. In fact, the concept of evolution should be perceived in terms of population statistics, and it refers to the intergenerational variability in a trait's distribution in a population: how a trait's frequency changes from generation to generation. Giraffes with longer necks have more offspring, so the next generation contains more giraffes with longer necks.

The process of 'survival of the fittest', the evolutionary phrase originally coined not by Darwin in his *Origin of Species* but by the English philosopher and sociologist Herbert Spencer five years after its publication, suggests that there are fitness criteria independent of evolution that the evolutionary process, in turn, detects. In fact, the fittest are simply the ones with the most reproductive success. The concept of fitness is virtually

circular and tautological: who will ultimately prevail? The fittest. Who are the fittest? The ones who ultimately prevail. *Who* these fittest are, and whether they are big or small, strong or weak, clever or stupid, is irrelevant to evolution, as long as they survive and produce offspring.

A certain trait being adaptive – which always becomes apparent in hindsight and never before the event – doesn't mean it represents the best possible adaptation. Evolution isn't optimisation. Many people wonder, for example, why we humans still develop cancer. Shouldn't this 'emperor of all maladies'[17] have been long defeated? Shouldn't evolution have made us immune? Unfortunately, evolution is indifferent to us individuals and our suffering. The only thing it's concerned with is how a trait affects the reproductive success of our genes. Most people have passed on their genes long before they develop cancer. The fact that it would be *better* not to get cancer in the first place means nothing to evolution: it's only interested in us being *just good enough*. What counts in evolutionary competition is being *comparatively more assertive* than the competition. Optimal quality is irrelevant. In fact, optimisation strategies are even maladaptive, as selective pressure rewards the most efficient use of resources. Perfectionists are always the first to go.

Not every trait is due to a process of adaptation. As well as adaptations, there are also exaptations, where the functional profile of a trait that originally ensured its selection later acquires a different purpose, or even better, a different function. The canonical example of this is the feather, whose original function was controlling the organism's body temperature, and which was only later reinterpreted through evolution as an instrument of flight. Also, changes in the manifestation of traits in a population often don't follow on from the reproductive differences caused by (dys)functional performance, but from random genetic drift. Non-adaptive drift occurs, for example, when a species goes through a population bottleneck: for instance, a flood or storm might eliminate the majority of a

group, leaving only the genetic information of those who were randomly spared.

After all, the fact that a trait is adaptive – that it leads to relative reproductive success – has nothing to do with that trait being good or desirable in any other sense. Evolutionary biology and evolutionary psychology are a panopticon of brutalities and obscenities that are often strategically advantageous but are ethically beyond questionable. Depending on the conditions, even murder and manslaughter, rape and theft, xenophobia and jealousy can be considered entirely adaptive. This doesn't make them morally justified.

The significance of the scientific discovery of evolution can hardly be overestimated. The idea that a seemingly deliberate adaptation can be explained by the uncoordinated interplay of mutation and selection is one of the greatest insights in human history, comparable to only three or four other discoveries of a similar magnitude. Nietzsche once predicted that 'when you gaze long into an abyss the abyss also gazes into you'.[18] The 'Darwinian abyss'[19] was to prove deeper than ever imagined. Dennett aptly describes the theory of evolution as a 'universal acid' that eats its way through each of our traditional concepts, ideas and theories.[20] Every ideology that comes into contact with it is fundamentally altered. Many have not survived this contact at all.

The improbability of cooperation

Over the last few millennia, a lot has happened with and to us. The philosopher and neuroscientist Joshua Greene imagines a superior alien civilisation visiting Earth every 10,000 years, hoping to find out if any of the resident species prove promising. When it came to *Homo sapiens* 100,000 years ago, they would have noted: 'hunter-gatherer bands, some primitive tools; population: 10 million';[21] and they would have made the same notes 90,000 years ago, 80,000 years ago and 10,000 years ago. But their notes from their last visit in 2020 would say something

very different: 'Global indust. economy, advanced technology w/ nuc. power, telecom., artificial intel., extraterrestrial travel, large-scale social/political institutions, democratic government, advanced scientific inquiry.' We have come a long way, and our capacity for morality has substantially shaped and accelerated this development.

It didn't have to be this way. In fact it's very easy to imagine alternative scenarios. The American anthropologist Sarah Hrdy compares how a flight would play out with chimpanzees or humans as the plane's passengers.[22] I suspect that only very few people actually enjoy flying. But we have to admit that, despite the frustrating obstacles we need to overcome before we can get on board, it's all pretty civilised on the whole. After all, we sit there for several hours, crammed together among strangers, silent and motionless, fed questionable food and entertained by even more questionable media. There's the occasional irritation from a drunk passenger or a crying baby that won't settle, but how many people have ever experienced a serious or violent incident on board a plane?

How would chimpanzees behave under comparable conditions? The experiment would be ill advised: seats would be demolished, windows shattered; there'd be pools of blood on the carpet, torn ears, fingers and penises, countless dead apes throughout the plane, and great howling and gnashing of teeth.

Incidentally, this is not meant to imply that chimpanzees – or non-human animals in general – are entirely bloodthirsty and impulsive monsters incapable of cooperation. On the contrary, the point is that our human ability to cooperate works differently from all other animals': we cooperate more, and more flexibly, more generously, with more discipline and with less suspicion, even with strangers. Something makes it possible for us to see and make use of the benefits of cooperation. A world of new possibilities opens up for species able to recruit their own kind for a range of win-win projects. We are astonishingly good at recognising and embracing this.

Let's play a game

In the twentieth century, a particular scientific discipline emerged that to a large extent deals with the conditions and limits of human cooperation. *Game theory* investigates how rational agents interact with each other, and specifically tries to explain why it is often so difficult to create and stabilise co-operative action.

The term 'game theory' is unfortunate, as it suggests either a scientific preoccupation with playing – chess, poker or basketball, for example – or that human coexistence should be derided as a frivolous pastime. Neither is true. In fact, game theorists are interested in describing human interaction with precise mathematical models – with the aim, first and foremost, of understanding why cooperation so often fails or doesn't even come about. The term 'game theory' refers to the fact that interactions can be regarded as sequences of actions in which the previous move, A, determines what the best return move, B, would be.

Behaviour is described as 'cooperative' at the specific point where it puts immediate self-interest aside in favour of a greater common gain. This has nothing to do with self-sacrifice: everyone benefits from cooperation, which is why it is particularly frustrating when it breaks down as a result of pettiness, impulsiveness or short-sighted thinking.

Cooperative actions are based on norms that limit an individual's maximum rational benefit, but that lead to win-win situations, which in game theory are referred to as games with *positive sums*. Zero-sum games, such as poker, are characterised by the fact that one person's losses are the other's gains – the sum of gains and losses is zero. In negative-sum games, everyone loses. Because no one loses out when cooperative win-win interactions take place, they meet a significant criterion of justice: they can be justified to everyone involved.

There's at least one key concept from game theory that has found its way into popular discourse: the concept of the

'prisoner's dilemma'. The story goes something like this: two criminals have been arrested by the police, who can prove that both have committed a minor crime (such as illegal possession of weapons), but they actually want to charge them with a recent bank robbery, although there isn't enough evidence for this yet. So the two are taken to separate interrogation rooms, and they are offered a deal: if person A blames person B, A gets away with a light prison sentence of one year. Once this has happened and they can prove B has committed both crimes, B will have to serve ten years. But B is offered the same deal. If both remain silent and the police can only charge them with the lesser offence, they both get just three years. If both betray each other, they can each expect five years. Since neither can communicate with the other, they each have to pick the optimal strategy for themselves. A might think, 'If B snitches on me, I should snitch on B as well, otherwise I'll go to prison for ten years as the sole culprit. But what if B keeps his mouth shut? Then I should grass him up anyway, as it'll reduce my sentence to one year.' The problem is that they are both in the same boat. So each will blame the other, and they can both expect five years.

The prisoner's dilemma seems to describe a specific and rare situation that isn't relevant to everyday life. In fact, it is just a dynamic illustration of a more general problem that we can use to accurately model the basic conflict of social interaction. Cooperative behaviour is almost always the best option for everyone involved. The problem is that it's even better *for an individual* if everyone *else* cooperates but if he or she can outsmart all the other people. In other words, uncooperative behaviour is always the best choice for every single person, regardless of whether or not other people cooperate: if I'm going to be lied to, I'm better off lying myself. If the others are honest, I'm still better off lying. Non-cooperation becomes the *dominant strategy*, and so mutual non-cooperation emerges as a stable *Nash equilibrium*: no one person can unilaterally

break out of this equilibrium without putting themselves at a disadvantage. The paradox in the prisoner's dilemma is that it shows how individual rationality and collective reasoning can fall apart. When everyone acts rationally on an individual basis, the results are collectively suboptimal. The fruits of cooperation remain unharvested.

Once you get the basic idea, you start to see prisoner's dilemmas everywhere – or more generally speaking, collective action problems. This is mainly due to the fact that in reality, collective action problems are *everywhere*. Perhaps the best-known examples of this can be found in the depletion of natural resources. This problem – anticipated by the Scottish philosopher David Hume as early as the eighteenth century – has been known as the 'tragedy of the commons' since Garrett Hardin wrote about it.[23] The American ecologist observed that natural resources – farmland or fish stocks, for example – tend to be exploited beyond the limits of their capacity if they are not privately owned. Regardless of how others behave – sustainably or exploitatively – the best strategy for every individual is to over-exploit the resource in question. The benefits of this misconduct can be absorbed by every individual; the costs are 'externalised' to the rest of the collective.

Many seemingly trivial everyday phenomena can be analysed as collective action problems. Motorway traffic jams are often caused by the indiscretion of rubberneckers, braking for a quick gawp at a crash and forcing everything to slow down behind them. Trampled footpaths are shortcuts that are beneficial for each individual, but ultimately they leave unsightly furrows in the ground for everyone.

In economics, ever since Thorstein Veblen's *Theory of the Leisure Class* (1899), there has been talk of 'conspicuous consumption', a situation where considerable resources are often spent on status symbols, not for intrinsic pleasure, but for purely *positional* effect: they are only valuable if (and because) other people do not possess these particular items. But as soon

as the competition has caught up, they are all worse off: everyone is poorer, but no one is any happier, and it would have been better if the collective 'keeping up with the Joneses' had never begun in the first place.[24]

Politically, game theory has particularly proved its worth in relation to the madness of the arms race during the Cold War.[25] For many intellectuals, the world seemed to have gone crazy, with the two sides' minds poisoned by irreconcilable ideologies that made their opponent seem inferior or evil. But this explanation is also fatally wrong because it relegates the problem to being merely out of the ordinary and insurmountable, instead of seeing the mundane crux of this scenario of reciprocal deterrence. If everyone else gets nuclear armaments, I'm better off having nuclear weapons as well. If I'm the only one, so much the better.

Many social problems can also be described in this way: American gun owners like to point out that they feel safer with a firearm than without; self-defence is recognised by almost everyone as a legitimate aspiration, which is why the US gun lobby explains away the call for more effective regulation, especially of powerful weapons such as assault rifles, either as a symptom of snowflake East Coast decadence or as encroaching control freakery from the Washington elite. Game theory shows that this is nonsense, and in reality, this is also about managing a situation in which the individually rational action of owning a weapon is collectively irrational. Universal possession of weapons immediately eats away at an individual's gain from self-defence: bigger and bigger guns need to be bought until the only way to secure neighbourly peace is with tanks. And even that won't work in the long run.

Today's raging anti-vaccination campaign is a scandal that ultimately also stems from a collective action problem. The alleged risks that exist from vaccination are mainly fictitious, but who wants to sacrifice a morning in the doctor's waiting room, holed up with strangers' sickly children, just to have

your own kids kicking and screaming about getting a needle in their arms? If everyone else gets vaccinated, you can enjoy the benefits of herd immunity without having to put your own child through this. It's only when the vaccination rate drops below the level of herd immunity that it becomes rational to opt for individual vaccination again, as the cases start to rise. Anti-vaxxers – apart from the fact that they often believe in outrageous conspiracy theories – don't behave unreasonably, but *immorally*, because they're benefiting from cooperative structures without contributing themselves.

In the biological realm, collective action problems are everywhere. California's sequoias grow over a hundred metres tall just to secure the best spot in the sun. Unfortunately, they are incapable of contractually guaranteeing each other a maximum height of fifty metres, which could put a quick end to this obscenely inefficient competition.[26]

Collective action isn't impossible, but the previous examples and the logic of collective action problems show that massive obstacles, with no universally valid solution, stand in the way of forming an 'us' with the power to act. The problem that cooperative arrangements always remain vulnerable to exploitation is not a problem with a solution. What does this mean for the evolution of our morality? Imagine a small group of fictional humanoid beings. Each fights for itself and is only interested in its own gain. No cooperation takes place at all. And then, through random genetic mutation, an individual emerges that is configured a little more altruistically and cooperatively than the others – but only slightly. This individual has a rudimentary sense of morality and sometimes tends not to exploit others or to put its own self-interest above all the others' interests.

A variant like this could never become established, and it would quickly perish in the struggle for resources and reproduction. Selection pressure would be ruthless for this variant and it would not be able to propagate within the population. The opposite case of a group of cooperative beings helping