

## Chapter 2

# Historical and Philosophical Reflections on Natural, Enhanced and Artificial Men and Women

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**Abstract** This chapter considers human engineering from a historical and philosophical perspective. Engineering suggests artificiality and thereby takes us to the issue of ‘nature versus nurture’. Must any intervention in natural growth and development patterns be considered ‘artificial’? Humans belong to a domesticated species, and the notion that human beings are shaped through both their biological heritage and their upbringing is as old as Western thought itself. Ideas about the manufacturing of humans—homunculi, golems or Frankensteins—remained usually in the sphere of pure speculation. Only in the twentieth century was the old suggestion, first formulated by Plato, that it would be profitable to breed humans like cattle first translated into political measures, as a consequence of social Darwinist ideas. Historically, we find ourselves in a unique position because we are, for the first time, able to change the human body through technological means. While many current practices can still be defined as therapeutic interventions, as genetics and artificial intelligence are further developed, the ethical issues involved in their application will inevitably become more complex. It is of great importance that before science and technology present us with unpleasant choices, society itself, as well as legislators and scientists, should determine where to draw the line between desirable and undesirable modifications of human nature.

As the Introduction to this volume has indicated, current discussions concerning the perfecting, engineering, conditioning, manufacturing or enhancing of humans

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Translated by Samuel van Kiel.

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mix facts and fictions and tend to view actual scientific and medical practices in the light of possible and imaginary future developments. For this very reason, the debate often suffers from a lack of conceptual clarity.

Let us therefore begin by unpacking some of the underlying concepts. The most important idea that calls out for analysis is that of the un-tampered with, ‘natural’ man, the presumed subject or victim of all technical interventions. The notion of ‘artificial man’ implies, after all, that there is such a thing as a ‘natural man’, from whom he can be distinguished.

## Traditional Ways of ‘Making Humans’

To begin with, let us recall that traditionally, Christianity considers man to have been made in a non-natural manner—namely by God. According to the biblical descriptions in Genesis 1 and 2, the Creator ‘made’ Adam and Eve (*fecit*, in the Latin of the Vulgate), together with the world and its other inhabitants. Conspicuously, the notion of nature and man as products of the divine Artificer, the *summus Artifex*, seems to suggest that humans, even when they dwell in the most natural of places, Paradise, were artefacts. To disentangle the apparent contradiction inherent in the notion of a natural artefact, theological jargon distinguishes human acts of ‘making’ (from existing materials) from divine acts of ‘creating’ (out of nothing, *ex nihilo*).

It is worth keeping in mind the distinction between fabrication and creation when considering the claim made by religious critics that today’s geneticists are ‘playing God’. Strictly speaking, this claim may be rejected by pointing out that geneticists are unlike God precisely because they cannot ‘create out of nothing’; at best, they intervene in, and modify, existing materials. Their ways of making would, therefore, differ fundamentally from the Creator’s.

However, when the accusation of playing God is levelled against genetic engineers, this does not refer to the act of creating as such, but rather to the alleged modification of the *essence* of a God-given human nature. Nick Bostrom summarises the logic of the charges as follows: ‘playing God, messing with nature, tampering with our human essence, or displaying punishable hubris’. But note that this concatenation of accusations is hardly self-evident. To begin with, the belief in static, species-related essences is not Judeo-Christian, but Aristotelian in origin, and it is doubtful whether a modern theologian needs to subscribe to it. Even present-day supporters of ‘intelligent design’ are usually content with a God who created natural species in such a way that they may continuously change from within, and in so doing propel evolution in the process. More specifically, as far as the question of the essential nature of humans is concerned, both Aristotelian philosophers and Christian theologians would concur that it is to be found in the soul (which to the Aristotelian represents the specific form of man)—yet, no one accuses geneticists of tampering with the soul. Lastly, it is also to be doubted whether such an essentialist view on natural species should be upheld, even from a

theological standpoint, in a period in which most educated contemporaries conceive current species to be the result of an evolutionary process. In short, associating the modification of human bodies with playing God is dubious from a theological point of view and outdated philosophically.

When we worry about contemporary or future attempts to make artificial humans, we obviously do not intend to refer to divine acts. We also exclude the other obvious possibility of making humans; namely, parents' traditional way of 'making babies' through copulation. Incidentally, the seventeenth-century Flemish philosopher Arnold Geulincx correctly pointed out that the expression 'making babies' is odd and linguistically inaccurate. A potter who 'makes a pot' has acquired the skill for his trade and is able to 'make' a pot precisely because he knows *how* to make one. A man and a woman, on the other hand, have on the whole little understanding of what happens between that enjoyable night and that moment, roughly 9 months later, when a brand new, tiny but complete human person materialises from the woman's womb. Certainly, the parents have not 'made' the child in the common sense of the word.

Having now excluded divine acts of creation and human acts of procreation, let us examine the types of 'making humans' that are suggested in current debates. What we find in all discussions are the following two elements: (1) human action (as opposed to divine intervention) and (2) artificial methods of production (as opposed to natural ones).

While these definitional restrictions may prove useful, they also raise new questions. Specifically, it remains to be seen whether 'artificial' and 'natural' are really opposites, as one would expect. When organic shops conjure up the notion of 'natural foods', they obviously do not intend the opposite of 'artificial'; in fact, the organic cabbage that is sold is not the opposite of non-organic cabbage. Rather, what the shop owner means is that his or her cabbage has not been sprayed with chemicals. Applying this reasoning to human beings, it is clear that someone is called 'natural', instead of 'artificial', when he or she has not been 'treated'. There is, however, a problem with both the cabbage and the human being: neither life form grows in the wild—both are cultivated products! The question of distinguishing between treated and untreated, and between natural and artificial, in human beings, takes us to the well-known debate about how much of our behaviour results from nature and how much from nurture. While this age-old debate needs not to be examined here, it must be obvious that we humans have never been entirely 'untreated' and 'organic'. We are, perforce, socialised creatures who are raised in a cultured, and therefore unnatural, environment.

But if the definition of a natural human being remains elusive, then the same must needs apply to the definition of an artificial human being! Indeed, in the literature, we encounter a surprisingly diverse range of examples for the term 'artificial human', of which the most important are the following:

- someone fertilised in vitro;
- someone with different ('modified') DNA with respect to that of his or her parents;
- someone cloned from the cells of another individual;

- someone who is ‘enhanced’ in a number of ways, through genetics or technological implants, in order to perfect his or her looks and abilities;
- someone composed of organic material and a neurocomputer that controls cerebral functions;
- someone who is not made up of any organic materials and instead is a machine that simulates human behaviour perfectly.

These six examples have little in common. The first five display a progressive gradation in modifying human material; with the last example, modification has made way for an entirely artificial copy.

It is clear from what has been discussed so far that we use the term ‘artificial’ as an umbrella term that applies to any kind of intervention in natural patterns of growth and development. Is it legitimate, however, to equate artificiality with any type of intervention? Is such an equation credible in our modern society, which, all the way from prenatal diagnostics to the nursing home, protects and prolongs life by technological means? In other words, does life in modern society, from ‘good clothes, a well-stocked larder, a TV set, a car, a house and so on, all within the existing order’ (Herbert Marcuse), take place within an essentially unnatural, indeed artificial, context? Or, put even more radically, is the cunning *homo sapiens*, who is ‘knowing’ by definition and therefore a dexterous tool creator, not always actively helping, improving or denying the natural through ways of the artificial?

Throughout the centuries, people have without any hesitation accepted that human beings have been shaped, conditioned and improved through natural selection, education and indoctrination. This acceptance, then, takes us to the following question: what is it that is substantially different about contemporary attempts at improving human beings?

This question becomes particularly difficult to answer when we consider contemporary humanity as the merely provisional and transient result of the evolutionary power of selection. If *homo sapiens* is itself the result of a process of selection which has continuously preferred individuals and species made up of favourable attributes, then to what extent are modern attempts at improving human beings anything else than a conscious execution of ‘natural’ forces? We shall have to return to this question below.

## Breeding Humans

The way in which the current debate talks about engineered or artificial humans suggests that science is tampering with the ‘natural form’ of human beings. Yet, we have just questioned whether one can presuppose that such a thing as a ‘natural’ human being exists. Concerning plants and animals, we can distinguish ‘wild’ species from ‘domesticated’ ones: the first reproduce freely and without restraint, while the second are cultivated or bred. We humans would seem to belong to the second kind. Humans do not grow up in the wild, such literary

examples as Mowgli or Romulus and Remus excluded. *Homo sapiens* is an ‘eminently domesticated animal’, to invoke an expression once used by Charles Darwin.

Farmers have known from time immemorial that they, using techniques such as grafting (for plants) and breeding (for animals), can improve the quality of new stock by combining the parents’ desired attributes. The same techniques can obviously be applied to the human species. The most famous proposal to apply breeding techniques to human beings is found in Plato’s *Republic*, written in the fourth century BC. Plato suggests that it would be advantageous for a state if the ruling classes were produced using the same criterion that farmers use in improving their animal livestock. Men and women with the best physical and mental attributes should be selected and encouraged to reproduce—outside of any family context, remarkably enough—and their progeny would subsequently be trained to become the ideal members of the ruling class. Aware of the difference between humans and livestock, however, Plato developed his scheme to go beyond breeding alone. He accurately described the intellectual, athletic and psychological programmes through which children would have to pass on their way to perfection.

The notion of the profile of an individual human as being as much determined by inherited and psychological features as by his or her physical, emotional and intellectual characteristics is therefore clearly as old as Western philosophical and scientific thought itself. The expressions ‘well-bred’ and ‘of good extraction’, used to typify a person conforming to acclaimed standards of behaviour, derive from this original farmers’ experience, which had already risen to Platonic heights more than two millennia ago.

Plato’s project was not carried out at the time, and it is somewhat surprising to historians to find that the concept of breeding humans as one would breed horses and cows was ignored even in times when Plato’s philosophy was *en vogue*. In fact, even the historians’ surprise has historical precedents. In Tommaso Campanella’s *The City of the Sun* (1602), we encounter a senior official of a utopian state ‘who takes care of generation, and of the union of males and females in such a way that they produce a good race. And they laugh of us because we look after the race of dogs and horses, but neglect our own’. Only after 1859, thanks to the publication of Charles Darwin’s *The Origin of Species*, did a serious debate initiate about the long-term effects of goal-oriented selection in the process of domestication, as Darwin’s readers started taking the idea of breeding humans seriously. If evolution truly functioned the way Darwin described it, so some of his followers reasoned, then it would be beneficial for a society to act analogously to the way that farmers do with their livestock by guiding society’s reproduction through approved directives. Imposed choice was to replace chance.

In 1865 Francis Galton exclaimed: ‘What an extraordinary effect might be produced on our race, if its object was to unite in marriage those who possessed the finest and most suitable nature, mental, moral, and physical!’ These extraordinary results could, however, only be obtained on the basis of a specific policy that would prevent the increase and propagation of inherited vices such as ‘craving for drinking or for gambling, strong sexual passion, a proclivity to pauperism, to

crimes of violence, and to crimes of fraud'. A supposedly scientific movement emerged which called itself 'eugenics' (literally 'well-born'), which was influenced by voices like Dalton's; voices which were grouped together under the term 'social Darwinism'. This movement worked towards 'the self-direction of human evolution'.

In the early decades of the twentieth century, scientific and political leaders in various countries propagated measures to 'self-direct human evolution', according to the slogan of the eugenics movement. Initially the movement advocated policies, to be implemented by the government, of facilitating civilians who had the desired characteristics (positive eugenics) and of hindering the reproduction of civilians with undesirable characteristics (negative eugenics). In immigration countries such as the United States, this meant for instance that certain values were attributed to specific immigrant groups. A policy was adopted which encouraged the influx of families of highly valued races and discouraged an influx of any of the other races. Charles Davenport, director of The Station for Experimental Evolution in Cold Spring Harbor as well as of the Eugenics Record Office, wrote as early as 1910 that 'society must protect itself, as it claims the right to deprive the murderer of his life, so also it may annihilate the hideous serpent of helplessly vicious protoplasm'.

Notoriously enough, Nazi Germany took this concept further than any other nation: to them racial cleansing justified the ruthless extermination of so-called inferior races, a programme that complemented the positive strengthening of the Nordic races through institutions of reproduction such as *Lebensborn*. While eugenics has thus in its worst manifestation led to genocide in the name of racial cleansing, it has more frequently implied sterilisation programmes for individuals with a mental handicap, which were implemented not only in communist countries, but also in Sweden and elsewhere. Moreover, even after World War II, a series of European countries ran programmes that systematically snatched away gipsy children, who could subsequently be adopted by 'regular citizens'.

Such measures are without a doubt attempts at steering the makeup of society through governmentally implemented choices in reproduction. It is, however, unclear whether the results may be called 'artificial'. Eugenicists themselves argued that their measures only reinforced, or gave direction to, a natural process of selection that is, unconsciously in nature and consciously in human societies, omnipresent. Did not nobles traditionally marry other nobles and landowners other landowners, while the affluent could afford to marry the beautiful and healthy of lower extraction, thereby enhancing the vigour and looks of their own families? And did not, by contrast, those who were redundant and physically or mentally less endowed die of hunger? Were not the superfluous sent to die in battles as mercenaries or confined to monasteries where they were deprived of the possibility of reproducing themselves?

There is certainly some truth to the claim made by the proponents of the eugenics movement that they did not propose anything 'unnatural'. They merely claimed to carry out the work that 'nature unrestrained' would have done if left to its own device; namely, exterminating the weak and destroying those who in

natural surroundings would not be fit to survive. In fact, the movement claimed it was rather the behaviour of civilised society that ran counter to the demands of nature, by setting up orphanages, poorhouses, psychiatric institutions and hospitals, which only served to keep alive those who were in truth unfit to live. This type of reasoning, which is often traced back to the writings of Herbert Spencer, asserts that the brutal measures suggested to government merely represent a return to natural law and counterbalance the artificial and moreover detrimental forces of civilised behaviour.

Whoever intends to reject such social-Darwinist reasoning—and to reject it has since the atrocities of World War II of course become the universal norm—will have to do so on the basis of ethical reasoning. Ethical rules, however, are not rules concerning our natural and ordinary behaviour; rather, they concern how we *should* behave. The nineteenth-century Darwinist Thomas Huxley was quite right about this point: ethical norms are the absolute opposite of ‘naturalness’. If one accepts the supposedly natural law of the survival of the fittest as the ‘natural’ touchstone for behaviour, then one has to accept a ‘gladiatorial theory of existence’, in which the strong have the right to kill the weak. Ethics is, in this view, an antidote; a collection of rules that allow us to defy nature’s ruthlessness.

What does this short historical survey teach us? We may assert, it would seem, that initially, positive eugenics simply took Plato’s old suggestion seriously: the only way to produce better humans was by crossbreeding suitable individuals. The twentieth century offered new, previously unimaginable opportunities through scientific and technological advancement. Literature had, as so often happens, already foretold these opportunities. In 1932, even before Hitler, with all his obsessions with racial purity, had ascended to power, but in the heyday of eugenics, Aldous Huxley published his famous *Brave New World*, which to this day continues to appeal to our scientific imagination. It is routinely overlooked that the core of Huxley’s novel is once again Plato’s proposal to breed social classes from within an institutionalised governmental apparatus and outside of familial structures—although reproduction in Huxley’s world takes place *in vitro*, and not, as in Plato’s *Republic*, *in vivo*. What renders these nightmares relevant is, however, that they wed Platonic fantasies with twentieth-century science and technology. Indeed, they sketch an insidious mix of biological reproduction methods and psychological techniques of imprinting, which are aimed at conditioning both individual and group behaviour. To these techniques, Huxley adds the happiness-inducing drug ‘soma’, which is applied whenever conditioning alone proves inadequate to achieve the state-imposed individual feeling of happiness.

## Conditioning People

Huxley’s combination of biological, psychological and drug-related methods of conditioning leads to different kinds of perfecting or engineering human behaviour. As mentioned earlier, the eugenicist Charles Davenport believed that in order

to improve society, people needed ‘to annihilate the hideous serpent of helplessly vicious protoplasm’. His claim that our genetic makeup fully determines who we are marks one of the extremes in the nature-versus-nurture debate. It is astonishing to realise that the other extreme was voiced in the same time period and in the same country, by the American behaviourist John B. Watson (1930), p. 104:

Give me a dozen healthy infants, well-formed, and my own specific world to bring them up in and I’ll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors.

Watson completely contradicts Davenport, giving a diametrically opposite interpretation to what it means for a human to be conditioned. In fact, he is much closer to traditional views of what it means to perfect or indeed ‘make’ humans. Throughout history, the malleability of human nature has been mostly associated with the ability to shape speechless infants through upbringing into well-functioning, morally upright and responsible adults. By analogy, even today, we call a ‘self-made’ man or woman someone who is the architect of his or her own fortune. Irrespective of how we regard this malleability of the human character, which allows particularly the young to develop their personal character in response to upbringing and to pedagogical, religious and ideological indoctrination, it represents without a doubt the oldest form of modification. *Homo sapiens* has ever since it first appeared as a species lived up to its own name by passing on techniques, knowledge and convictions through education. Raising the young has always involved using carrots and sticks—encouragement and punishment. In his *Philosophical Investigations*, the philosopher Ludwig Wittgenstein compares the acquisition of a language, the first step in human education, to the training of a dog: in order to understand a language one must first of all develop the correct behavioural response to hearing a word.

Now, in the context of our present analysis of ‘natural’ and ‘artificial’ human characteristics, it is important to realise that in many cultures education is seen as an act of suppression of natural tendencies. In a Christian context, for example, it has long been common to think that the body possesses a natural tendency towards sin. This tendency was the inherited consequence of the fall of man, namely ‘original sin’. Within this context, education and self-taught spiritual practice up to and including the act of self-flagellation were considered the appropriate remedies to suppress natural but sinful bodily urges and to elevate the mind above them.

At the same time that educational conditioning was being taken out of its traditional religious context, it became a central question during the transformation of psychology into an experimental science. Pierre-Jean Cabanis writes in one of his *Rapports du Physique et du moral de l’homme* in 1802, vol. III, p. 433:

Without doubt, it is possible, by a plan of life, wisely conceived and faithfully followed, to alter the very habits of our constitution to an appreciable degree. It is thus possible to improve the particular nature of each individual; and this goal, so worthy of the attention of moralists and philanthropists, requires that all the discoveries of the physiologist and

physician be considered. But if we are able usefully to modify each temperament, one at a time, then we can influence, extensively and profoundly, the character of the species, and can produce an effect, systematically and continuously, on succeeding generations.

Rising ideologies brought with them attempts at ‘an effect, systematically and continuously, on succeeding generations’, through collective education. Such attempts were seen as a way of producing the kind of citizen that a society wanted. An extreme example of such collective, educative conditioning is the Soviet Union, which rejected the blind evolution described by Darwin and preferred a crude version of Lamarckian inheritance (known as Lysenkoism in the period 1930–1950), as efforts were underway of producing a *homo sovieticus* mostly through educational means, and only in the second instance through biological selection.

It is, however, useful to remember that the notion of collective, educational conditioning is also present in democratic societies today. Cornips and van Asselt, in their contribution to this book (Chap. 4), show that policy makers in the Netherlands quite generally subscribe to the notion that the steering and modification of human behaviour can be achieved through laws, economy and education.

In sum, then, separating naturalness from artificiality is especially difficult, if not impossible, in the case of shaping and indeed producing specific types of human agents through education. It seems impossible to imagine an exemplar of *homo sapiens* that has not been denaturalised. Once again, the species name *sapiens* of the genus *homo* indicates exactly that state of knowing that separates us from a state of unreflective naturalness.

## Artificial Humans from the Past

So far, we have looked at two unbroken traditions of thinking about methods of conditioning, modifying or improving humans, namely crossbreeding and upbringing. The current debate about the modification of humans does not, however, focus primarily on these well-known kinds of modification, but centres on the fear that new technologies will propel humans beyond the traditional processes of natural procreation and upbringing.

But even this fear is not a new phenomenon: artificially created humanoids have existed for some time—in the form of fiction, that is. Let us, therefore, take a quick glance at the older types of artificiality so as to pin down more exactly the place of today’s spectres of artificial humanity.

One traditional type of artificial human is one that is brought to life through magic. Take, for example, the golem, a clay figure which is, according to Jewish legend, brought to life by rabbis using Cabbalistic spells. This animation was inspired by the story in Genesis 2, where God creates Adam from clay and blows life into him. No sooner is the spell removed than the golem turns to dust. This type, an imitation of creation and dependent on magic, is of course of little relevance to

current expectations and fears, even though the science fiction writer Stanisław Lem did transpose the golem story to the era of robotics.

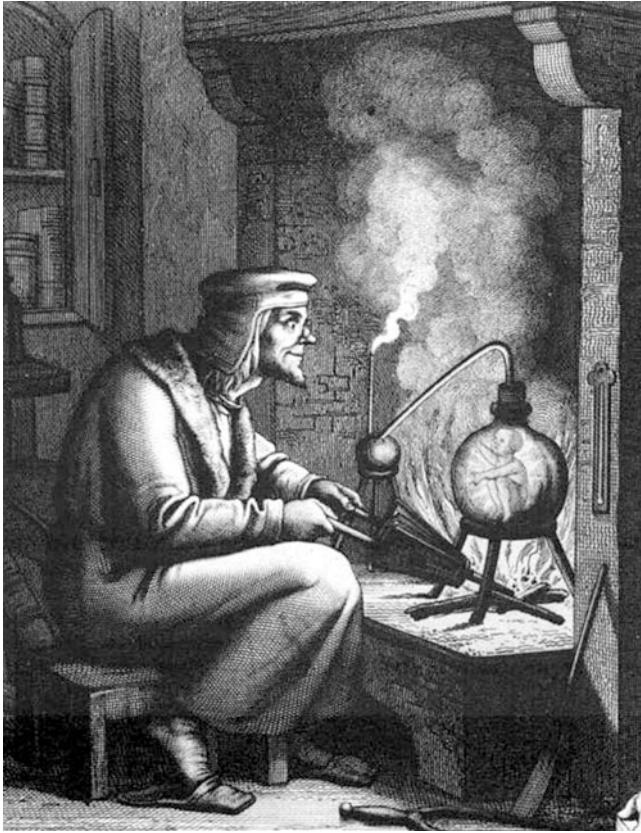
It is of more immediate interest here to examine those fake animations of statues and dolls that the ancient and early modern technicians loved so much. Long before Alan Turing came up with the ‘Turing test’—are we able to distinguish a human being from a computer based on the answers given to our questions?—technicians invented all sorts of ways of tricking an audience into believing that a machine figurine was a human being. The success of craftsmen who made puppets that could imitate human gestures, in combination with certain seventeenth-century breakthroughs in the understanding of human physiology, convinced the philosopher René Descartes and his followers that even the bodies of ordinary humans were no more than mechanical devices.

Apart from the golem and the fabricated *homme machine*, history also tells us of another type of artificial human: the chemically produced human, of which the alchemists’ homunculus is the earliest example. Figure 2.1 shows a Paracelsian alchemist who produces a ‘little man’ (homunculus). In contrast to the mechanical doll that inspired the Cartesians, it was rumoured that in order to produce a homunculus, one needed biological substances: the alchemist simulated biological reproduction by placing male seed in his flask (which represented a type of artificial womb) to set in motion a process of sublimation, using an oven to trigger the process.

Of course, no homunculus has ever emerged from the alchemist’s workshop, and neither has, some centuries later, any artificially created monster escaped from any chemical laboratory: the heavily breathing creature in Mary Shelley’s *Frankenstein* (1818) never left the novel’s pages. Still, the homunculus, the monster from *Frankenstein* and the Faustian scientists responsible for their existence live on in our collective, literary memory as an expression of a deep-seated fear, which today may be stronger than ever: will not the results of our scientific experiments one day defy our control?

The very theme of escape and defiance is in any case a persevering literary subject. In Gustav Meyrinck’s novel *Der Golem*, the clay man flees his rabbi’s rule and becomes something of an immortal symbol of the wandering Jew. Similarly, Frankenstein’s monster escapes its creator’s laboratory. In our collective imagination, these precedents appear to illustrate how the future *Übermensch* will defy us, its makers. The title of one of Rakesh Kapoor’s essays (2003) reflects this fear well: ‘When Humans Outsmart Themselves’. In this essay, Kapoor describes Nick Bostrom’s idea that somewhere in the next 50 years machines will be propelled by artificial intelligence—an intelligence not merely surpassing human intelligence, but capable of making decisions independently, and indeed possibly going against what we had originally intended them to do.

Exactly in the way that in previous centuries Cabbalistic magic, alchemy, chemistry, engineering and eugenics spurred literary fantasies about the genesis of artificial humans, today we encounter sundry androids, transhumans and other uncannily modified, technologically produced humans in novels and films. Have such fantasies now become more realistic than their predecessors, or are they



**Fig. 2.1** A nineteenth-century engraving of Wagner the alchemist, from the second part of Goethe's *Faust*, manufacturing a homunculus

simply the mental product of our talent invariably to imagine alternative worlds and worst-case scenarios?

Each era faces the challenge of having to distinguish between realistic and unrealistic projections of current practices. This challenge has nothing to do with the run-away nature of human fantasy, but is due to the unpredictable nature of the evolution of science and technology. What makes contemporary fantasies especially hard to gauge is the fact that there are so many of them—they range from genetically manipulated humans, to brains maintained by machines, to humanoid robots—and that they traverse different, currently still separate scientific disciplines. To be sure, some of these fantasies and nightmares represent simple extrapolations of current practices. In an age in which hip replacements, organ transplants and pacemakers are normal, it is hardly difficult to extrapolate from these practices by imagining the replacement or enhancement of other body parts. Likewise, in a world where machines continue to replace skilled labourers, it is easy to predict that computers or

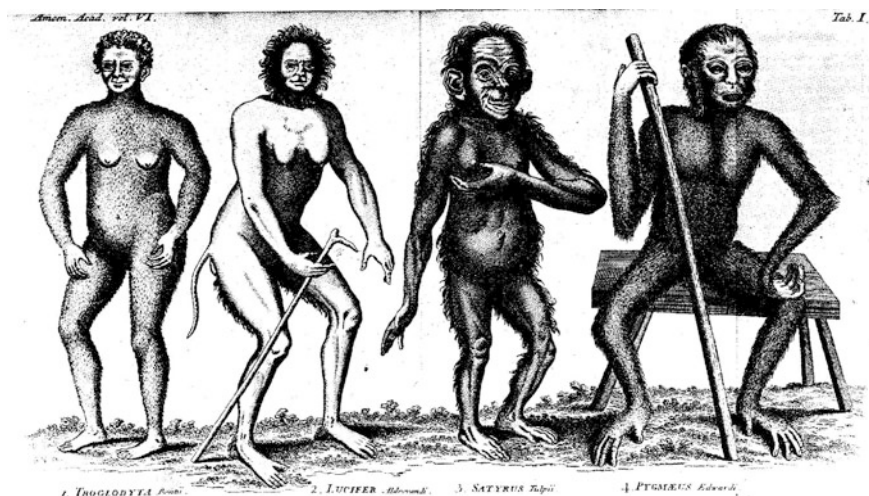
robots will be allotted further tasks in the near future. What is, by contrast, still difficult to imagine as a real, imminent possibility is the disappearance of the boundary between humans and machines. Currently, the difference between the real pilot and the auto-pilot is still very clear, while the moment in which this difference disappears is as impossible to predict as it is to imagine.

## Distinguishing Humans from Non-humans

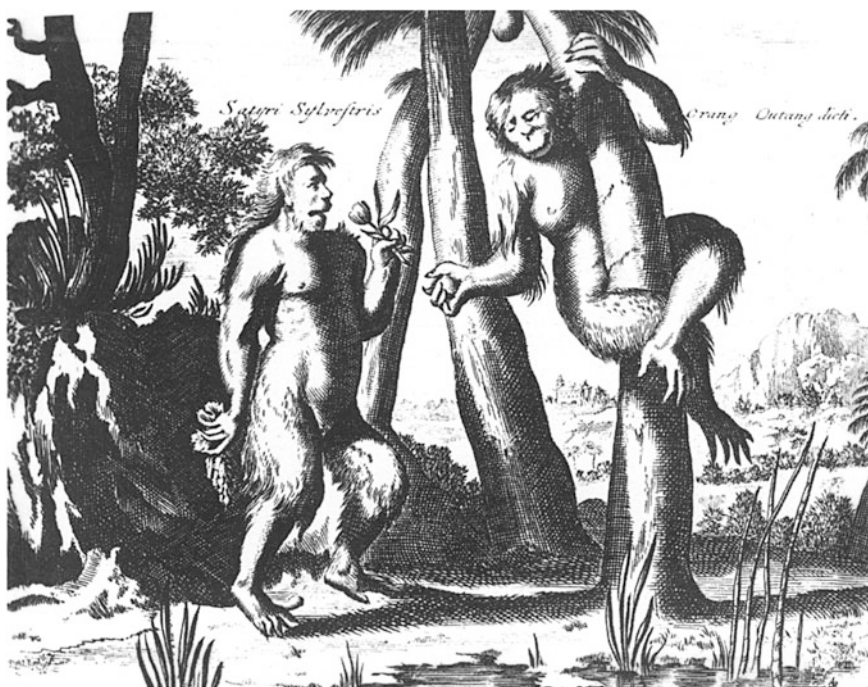
In the context of discussions regarding the nature and definitional boundary of humans, it is once more useful to take recourse to historical precedents. Two of them are of interest to us. The first concerns the boundary between humans and animals, the second that between humans and machines. Both must be briefly mentioned here.

In the period 1450–1800, following the discovery of sub-Saharan Africa and the New World, a considerable confusion came about concerning the dividing line between humans and other organisms. Travellers' accounts of Pygmies, Hottentots and apes made Europeans wonder whether they were dealing with different types of humans, with animals or with a cross between these two realms of nature. Many commentators were reminded of satyrs and fauns, humans with a goat-like appearance as depicted on Greek vases. In Fig. 2.2, an image dating from 1763, we encounter a collection of 'anthropomorphic creatures', showing from left to right a 'troglodyte' (a cave-dweller of sorts), 'lucifer' (a type of devil), 'satyr' and 'pygmy'. Were these forms all human? Where did one have to draw the boundary between human and non-human? In fact, when Europeans first encountered the orang-utan and learned from the locals that this name means 'forest man', they classified him accordingly. In Fig. 2.3, one sees a male courting a female, in a particularly Dutch way, namely with a tulip. The legend explains that what we see is a 'forest satyr called orang-utan'.

When in the eighteenth century Carl Linnaeus drafted his famous *Systema Naturae*, he classified each species into (1) kingdom; (2) class; (3) order; (4) genus; and (5) species. Humans, he decided, belonged to (1) the animal kingdom; (2) the vertebrate class; (3) order of primates; and (4) to the genus *homo*. But when having to decide on the species name, he faced a dilemma. In the early editions of his *Systema*, he split the genus *homo* into two kinds which he called 'diurnal' and 'nocturnal', classifying most species as active during the day, and others, like the orang-utan, as active at night. Importantly, Linnaeus indicated that on anatomical grounds, he had no reason to place humans into a different genus than orang-utans. Later editions show a remarkable shift: Linnaeus split the genus *homo* into two main species, *homo sapiens* and *homo monstrosus*. Particularly striking is the fact that the orang-utan is classified as *homo sapiens* (though belonging to a subspecies of 'wild human'), while mountain dwellers, Hottentots, Chinese and Indians are classified as 'monstrous man'. In other words, in Linnaeus' eyes some human races were less human than certain primates.



**Fig. 2.2** 'Anthropomorphic Creatures'. From: Carl Linnaeus, 'Anthropomorpha', in idem, *Amœnitates Academicae* 6, Stockholm, 1763, p. 76



**Fig. 2.3** Forest satyrs. From: Peter van der Aa, *Icones arborum, fructorum et herbarum exoticarum*, Leiden, 1700, plate 77

From our point of view, all of this is obviously somewhat of a laughing matter. Yet, Linnaeus' confusion is brought into a new perspective when taking into consideration contemporary geneticists, who claim that there is little difference between humans and chimpanzees genetically, and behavioural sociologists, who are experimenting in teaching primates to use tools and language.

Moreover, in science fiction this eighteenth-century confusion has recently witnessed a strong revival. Take *Star Wars*, for example, where normal-looking humans work together with intelligent primates and robots. Most of the time it is intuitively clear whether or not someone belongs to the species *homo sapiens*. In other cases, which are naturally the more interesting ones, this distinction is unclear, and such cases go to show just how unstable dividing lines really are. Modern robotics examines these divides, as Catholijn Jonker and Annemiek Nelis show in [Chap. 7](#)—divides, moreover, that may well have important legal consequences, as Bert-Jaap Koops proves in [Chap. 12](#).

It is particularly interesting in the present context to examine the early modern controversies about the dividing lines between humans and non-humans. First, because these debates show that the status and boundaries concerning our species have been unclear even before our technologically advanced age. Second, because a fundamental touchstone was used to distinguish human from non-human; namely, the immortal human soul, which was taken to constitute a uniquely human trait. Despite the fact that this soul could neither be seen nor measured, and thus could not be tested empirically, it did provide a unique ontological criterion for distinguishing humans from animals.

The immortal soul is today no longer considered the central criterion; self-consciousness has replaced it. This new benchmark, however, is far more problematic than the immortal soul. Not only is there a consensus among experts that some animals show behaviour that testifies to the presence of self-consciousness; it is also a matter of debate whether consciousness might turn out to be a necessary attribute of any highly complex neural network. Both considerations render consciousness a property that is not suitable for uniquely singling out humans.

Besides the contested borderline between humans and animals, there is also that separating humans from machines. Once again, the obvious point to start is in the early modern period. In the 1640s, René Descartes, whom we have encountered earlier, defended the notion that the bodies of animals are essentially machines that are complex enough to be self-multiplying. Inasmuch as they possess bodies that function like those of animals, humans are also just self-sufficient, multiplying machines. Yet, contrary to animal bodies, human bodies also house an immortal soul, a kind of spirit inhabiting a machine.

Descartes regarded our heart as a pump, our veins as pipes, our muscles as levering devices and our eyes as optical instruments, and he felt that it was legitimate to assume that all other parts and functions of our body could equally be explained in such mechanical ways. Was the movement of an arm towards an object anything more than a feedback device brought about by sensory input?

Descartes' view of the human body as a machine has enjoyed a strong revival in the twentieth century. For example, in his first bestseller, *The Selfish Gene*,

Richard Dawkins describes the human body as the ‘survival machine’ of the genes that carry its blueprint. As must be obvious, such a mechanistic view only makes things more complicated for our discussion. After all, if the human body is viewed as a machine, then it is hard to specify why a cyborg should belong to an inherently different category.

Against this view, it can be maintained that Descartes’ description of man as a machine was merely intended as an analogy with an explanatory purpose. For, Descartes did not claim that humans and man-made machines were the same; he merely asserted that human beings *work* like machines while being infinitely more complicated in structure. This is an important distinction to make. The real difference between Descartes’ description of humans as machines and the man-machine that some apostles of transhumanism enthuse about is this: the transhuman man–machine does not multiply naturally the way that Descartes’ *homme machine* does. The transhuman, partly designed by humans, breaks away from the evolved organisms the functioning of which Descartes tried to capture with his machine analogy.

For the time being, and pending the invention of truly revolutionary types of machinery, it may be said that the dividing line between humans and robots or transhuman androids consists above all, and maybe essentially, in the inability of the latter to reproduce their own (upgraded) form. This criterion resembles apostolic succession, the Catholic Church’s criterion for determining orthodoxy, whereby a church is only considered orthodox when its priests are appointed by bishops who in turn have been appointed by earlier bishops, going back uninterruptedly in a direct line to the time when Jesus appointed the apostles. Likewise, we might wish to choose as a criterion for distinguishing between ‘natural’ or ‘genuine’ and ‘artificial’ humans the criterion of direct descent, through natural reproduction, from historical humans (or ‘palaeohumans’, as Koops calls them in [Chap. 12](#)). It must, however, be clear that this definition by succession is only useful in the case of machine-enhanced humans or robotic imitations. It is, however, useless in the case of genetically modified humans, where an unbroken generational succession might be maintained despite immense modification of traits, capacities and behaviour.

## The Novelty of Our Historical Situation

We have examined a range of historical case studies to help us determine in which way our own understanding of what it means to modify human nature (and all the hopes and fears attached to it) might differ from earlier notions, hopes and fears. On the basis of what has been said it may be concluded that where ‘artificiality’ refers to conscious crossbreeding or to the modification or conditioning of behaviour, our current expectations and apprehensions do not differ in any real sense from those of past ages. It also seems that there is little new about the dream—or nightmare—of producing humans in a laboratory. This fantasy has been around for centuries, and it has to this day remained fictional.

What does, however, distinguish today's situation from all earlier ones is the concept of *perfecting existing humans* individually or collectively through technology. In the past, people tried to create better offspring by matching parents of good stock, or people imagined androids being made in laboratories or through magic. Only in the last decades has the idea emerged of modifying existing human individuals either through biological means (by replacing malfunctioning parts or genes) or by means of electronic aids (by adding gadgets which replace malfunctioning parts, or by improving parts that already function well).

Most of the current practices fall under the overarching term 'improvement'. Various aids are already in place, from pacemakers to Viagra, from Prozac to plastic surgery. Most of these have so far been of a corrective nature. Even Marijke Helwegen, who in the Dutch newspaper *NRC Handelsblad* of 2 June 2008 is called 'the ambassador of the artificial body', insists on repair and renovation, rejecting alteration: 'I have not been reconstructed; rather, I have been renovated. I was gorgeous, and I have stayed that way'. What Helwegen suggests is that all she does is to maintain her original appearance in the face of time's pitiless rule. Other forms of improvement allow performance quality to be pushed to new heights, yet, once more, without the insertion of new characteristics. None of these practices defy traditional ideas of human nature.

The predicted linking of artificial intelligence to the brain belongs, by contrast, to a different category altogether, because if successful, it would infringe upon traditional conceptions of personal identity, which since ancient times have been associated with mental phenomena such as memory and personal convictions. As early as 1957, Oswald Wiener designed a thought experiment in his novel *Die Verbesserung von Mitteleuropa*, in which a machine brings about a smooth transition from a natural to an artificial state of consciousness. Wiener's 'bio-adapter' is a machine that is placed on the head. After measuring and registering response patterns to stimuli for a certain period, it begins to imitate them in order to adopt the tasks of the biological brain. The unison between the processes of the brain and those of the machine enables the bio-adapter to ensure that the subject never becomes aware of the slow but continual displacement of control. In time, the machine is able to reproduce all conscious states of mind.

It is a small leap from Wiener's imaginative machine that reproduces the biological brain perfectly to a machine that brings about new mental processes. Those new processes could fundamentally differ from the mental conditions we normally observe in biological brains. This idea of replacing biologically-driven functions by technologically-driven ones is what I believe to be historically new. Previous generations have given much thought to artificially created human beings, yet these humans were always different, not 'us'. They were produced in laboratories in their entirety and were not enhanced by machines.

The so-called 'transhumanists', enthusiastic as they are about the envisaged consequences of technological improvements of the current human condition, do not view this situation as particularly alarming. They are of the opinion that the

human species as currently existing is not an unchangeable species to begin with, but rather a temporary step somewhere on the evolutionary ladder. They ‘view human nature as a work-in-progress, a half-baked beginning that we can learn to remould in desirable ways. Current humanity need not be the endpoint of evolution’, as Nick Bostrom, one of the founders of transhumanism, explains (2003, p. 493). He imagines transhumans who are not just more intelligent and learned, but also more amiable, friendly and richer in their aesthetic and introspective experiences: ‘Healthier, wittier, happier people may be able to reach new levels culturally’ (2003, pp. 498–499).

How does this ‘technological prophecy’ differ from the ‘natural prophecy’ by Alfred Wallace, the co-inventor of the theory of evolution, who in 1864 observed that ‘the power of “natural selection”, still acting on [man’s] mental organisation, must ever lead to the more perfect adaptation of man’s higher faculties to the conditions of surrounding nature, and to the exigencies of the social state’? The difference lies once again in the fact that fin-de-siècle techniques differ from today’s. Whereas evolution used only to be ‘assisted’ by directing choices in reproduction, transhumanist methods propose to alter the genetic makeup of humans and, moreover, to enlarge human capacities through technological means.

It remains doubtful whether such fantasies are any more realistic than those about the alchemist’s homunculus or the Cabbalist’s golem. But as the German philosopher Bernward Gesang rightly emphasises in his recent study *Die Perfektionierung des Menschen*, we must be ethically prepared to handle even the most absurd situation before it presents itself. Before we are confronted with the results of science and technology, we must decide a priori and as a society in its entirety on the limits of research and its applications. Basing himself on utilitarian ethics, Gesang suggests that we allow modifications of bodily and mental enhancements within well-defined legal limits, and within a social framework, while forbidding by law any radical restructuring of the human body or of mental functions. The latter carries severe risks of leading to grave social imbalances, and are therefore undesirable on a utilitarian account. Regarding genetic manipulation, Gesang pleads for the application of methods of improvement on children as long as this does not change their human appearance, and under the pretext that empirical proof has shown such methods to have worked on adults.

Gesang urgently and convincingly pleads for the need to determine the limits of our willingness to improve or deform human nature well ahead of the advent of the technologies that might allow for the relevant practices. As has hopefully become obvious from this chapter, the ethical and political task of defining and protecting the boundaries of human nature will benefit from a look at the past and from viewing our own expectations and fears against the background of the long history of views on human perfectibility. History has shown just how liable to change ideas on the essence of human nature have been throughout the ages. At the same time, an enhanced historical awareness helps us understand where the real technological difference lies between former aspirations and current ones.

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