

# Medical Enhancement and Posthumanity

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## VOLUME 2

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Bert Gordijn • Ruth Chadwick  
Editors

# Medical Enhancement and Posthumanity



Springer

*Editors*

Bert Gordijn  
Ethics Institute  
Dublin City University  
Ireland  
[bert.Gordijn@dcu.ie](mailto:bert.Gordijn@dcu.ie)

Ruth Chadwick  
University of Cardiff  
Cardiff Law School  
Museum Avenue  
Cardiff  
United Kingdom CF10 3AT  
[chadwickrl@cardiff.ac.uk](mailto:chadwickrl@cardiff.ac.uk)

ISBN 978-1-4020-8851-3

e-ISBN 978-1-4020-8852-0

Library of Congress Control Number: 2008933211

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Printed on acid-free paper

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# Introduction

Bert Gordijn and Ruth Chadwick

*We have given you, O Adam, no visage proper to yourself, nor endowment properly your own, in order that whatever place, whatever form, whatever gifts you may, with premeditation, select, these same you may have and possess through your own judgement and decision.*

Giovanni Pico della Mirandola, *Oration on the Dignity of Man*  
(1486)

Since times immemorial the regulative idea of *restitutio ad integrum*, reinstatement of human wholeness or intactness, has dominated medicine. Currently, the idea of restoring the normal functions of the human body still plays a central role. However, another notion has recently entered the medical limelight as well. Beyond merely reinstating the original physical and mental states of the patients, physicians are currently increasingly envisaging the improvement of the traits of perfectly healthy persons. Thus, the *restitutio ad integrum* doctrine is gradually being forced to share its status in present-day medicine with the *transformatio ad optimum* idea, reshaping persons who are already in good physical shape to further improve certain characteristics. This phenomenon is commonly called “enhancement”.

Ideas about enhancing human traits with medical means emerged as far back as the 17th century (see Gordijn 2006). Prior to this, medicine, like the natural sciences and technology in general, played only a minor role in thinking about possibilities of improving the human condition. This situation changed in the 17th century. As achievements in science and technology mounted notions of constructability and controllability of the human body gradually emerged. Three scholars in particular were to advance influential optimistic views about improving human nature through further medical developments: Francis Bacon (1561–1626) in his *New Atlantis* (1627), René Descartes (1596–1650) in his *Discours de la méthode pour bien conduire sa raison et chercher la vérité dans les sciences* (1637) and the Marquis de Condorcet (1743–1794) in his optimistic work *Esquisse d'un tableau historique des progrès de l'esprit humain* (1795). These works touch upon central themes regularly to be found in writings of modern proponents of medical enhancement. These themes include extension of the maximum human lifespan and the improvement of physical and mental traits.

However, there are two remarkable differences between the philosophical thinking about improving human beings with medical means that was prevalent in the 17th and 18th century and contemporary ideas about medical enhancement. The first difference concerns the extent in which medicine is being perceived as a particularly suitable means of ameliorating the human condition; the second regards the *de facto* power of medicine to change human physical and mental states.

(1) In the early days philosophical ideas about medical enhancement were firmly embedded in a more general sort of prevailing scientific optimism. It was widely accepted that human beings are able to craft their own ideal future, if only they make proper use of their intellect and organize and develop science in a methodically correct way. This basic optimistic thought was then set out in detail in three more specific ideas. The first idea was that of ruling over the living and inorganic environment surrounding us. Developments in the biology, chemistry, physics and the engineering sciences were thought to facilitate the endeavor of molding nature so as to flawlessly fit our human ends. The second idea was that of shaping a perfect society on the basis of historical, sociological or political scientific theories. The last idea was that of controlling and constructing the human body, as well as perfecting human nature, to be achieved by advances in medical science and technology.

At present, the naive sort of vigorous scientific buoyancy that was characteristic of the 17th and 18th century has vanished. Accordingly, the idea of attempting to control nature with scientific and technical means is regarded from a critical perspective by many. We have definitely lost our innocence after the Second World War revealed the terrible consequences of using nuclear arms. Weaponised nuclear technology may have contributed to the conclusion of the WWII, yet the human and environmental costs of deploying nuclear weapons in this fashion were immense. The threat of nuclear weapons was a deciding factor in the Cold War, and the use or misuse of nuclear technology remains a topic of enormous international concern to date. In addition, as the human population grew roughly fourfold in the 20th century ever increasing pressures on natural resources have deteriorated and depleted many resource bases, thus creating an increased potential for competition and conflict. Moreover, exploiting our environment we increasingly change its natural state. As vegetation and the animal kingdom cannot always successfully cope with these changes, species are now vanishing many times more quickly than by evolution and natural extinction. Furthermore, anthropogenic greenhouse gas emissions, from industry, transportation and agriculture, are contributing to global warming, a phenomenon that could have severe consequences for human kind. As a result of these and similar developments, enthusiasm regarding unbridled technological intervention in our environment in order to control nature has dwindled.

In addition, enthusiasm about shaping ideal societies has dulled significantly. More and more, it became clear that endeavors to radically improve our societies can have severe and uncontrollable downsides. The effects of 20th century attempts to change societies motivated by political ideologies such as Leninism, Stalinism, Maoism and Nazism have been unprecedented in terms of death and destruction. Dystopian and anti-utopian novels such as George Orwell's "1984", Yevgeny

Zamyatin's "We" and Aldous Huxley's "Brave New World" became part of the public consciousness. With the fall of the Soviet empire one of the last surviving "political utopias" had finally come to an end. In retrospect, many intellectuals in the West now seem to agree that most historical attempts to create "ideal societies" on the basis of certain historical, sociological or political theories have resulted in failures.

In contrast to the fading fervor for the ideas of creating ideal societies and technologically intervening in our natural environment so as to fit our ends, the idea of improving human nature with medical means is currently still triggering significant intellectual excitement. It is almost as if the disillusionment concerning dominating nature and shaping model societies has reinforced academic enthusiasm towards the idea of perfecting ourselves. Specific types of enhancements, such as cosmetic surgery, cosmetic dentistry, smart drugs and mood enhancers, seem to be counting on quite a lot of public support. Accordingly, many seem to believe that medicine may be instrumental in improving essential traits such as appearance; cognition and mood, provided certain medical research fields are appropriately promoted and financed. Thus, in contrast to the other two ideas of ruling over the living and inorganic environment surrounding us and shaping a perfect society, the idea of improving ourselves with medical means still seems to be viable and inspiring.

(2) From the moment the first ideas about medical enhancement emerged, the discipline of medicine was assigned enormous potential. However, in the 17th century medicine was *de facto* capable of very little. The general lack of medical knowledge and expertise meant that it was reduced to the alleviation of symptoms and moral support for patients. Initial enthusiasm surrounding the potential of medicine was therefore based chiefly on purely theoretical considerations and extrapolations. Today this has fundamentally changed. Enthusiasm is no longer reserved exclusively for theoretical considerations and hypothetical mind games. Contemporary euphoria is chiefly directed at real-life medical fields. Amongst the latter are fields that have already come up with clinical applications, such as cosmetic surgery, sports medicine, tissue engineering, psychopharmacology and bioelectronics. Moreover, developments at the preclinical stage are addressed. They include research fields like cloning, stem cell research, germ line genome modifications and interventions in the biological aging process. Last but not least, thoughts about medical enhancement are also inspired by developments which so far remain mainly theoretical, for example medical nanorobots and software resident intelligences. Be this as it may, the prospect of applying medical means in order to improve ourselves is currently much more realistic than it appeared two or three centuries ago.

Thus, medicine today has the public support as well as the scientific know-how and technological capability necessary to successfully realize the century old idea of *transformatio ad optimum*. More and more we will medically intervene in healthy persons in order to further improve certain characteristics. We have in fact already started to do so in many different medical fields. The best-known examples to date are anabolic steroids in sports, all manner of cosmetic surgical interventions and the use of Prozac, Ritalin and Viagra for non-therapeutic purposes.

Ultimately our striving to improve ourselves according to our own wishes might even result in a situation, where it is no longer appropriate to speak of a ‘human being’ at all. After all, interventions with the purpose of enhancement might bring about such radical changes that the result could only be regarded as a posthuman being, and no longer as a human being. Several contemporary authors argue that it is feasible and recommendable (or even morally required) that with medical help, we depart from our human existence, with all its innate weaknesses and imperfections. Various recent writings describe different scenarios of how this process could unfold.

In one example we will more and more apply bioelectronic and neural engineering systems in order to improve motorial, sensory and cognitive traits. This will result in an ever more symbiotic connection between the human biological system on the one hand and the various technical systems at work on the other. In fusing man and machine, human existence is ultimately surmounted and thus transferred into a posthuman mode of existence (Kaku 1997; Kurzweil 1999). In another example, humankind is reshaped with the help of germ line genome modifications. In contrast to so-called ‘somatic gene therapy’, in which only the genetic material of somatic cells is modified, germ line genome modifications can be passed on to the next generation. If they are performed consistently through successive generations, a genetically modified posthuman species might emerge (Silver 1997). A third example is ‘uploading’, a procedure that would involve transferring the contents of a biological human brain to a computer. This might be performed by first scanning the synaptic structure of a brain at a sufficient resolution by means of nanotechnology. This information would then be implemented in an electronic medium thereby bringing into existence a software resident intelligence. “Uploads” would not necessarily be disembodied. Not only might they have a virtual body, they might even use robot bodies in order to bodily inhabit physical reality (WTA 2007).

At present, all these “posthumanity scenarios” are still firmly in the realm of science fiction. However, this observation should not delay debates about the desirability of these scenarios. After all, space travel, IVF babies, radio, television, cell phones and the WWW were also science fiction only 100 years ago. Yet, they are very real phenomena today, influencing our lives in ways that we would never have imagined. It has turned out that our track record for predicting scientific and technological progress is not impressive.

It is a fact that we are increasingly using new medical technologies to change ourselves beyond therapy and in accordance with our own desires. Although at this early stage, it is impossible to predict exactly where this will lead us to, we will almost certainly enter new territory – not only in a medical sense, but also anthropologically, psychologically and politically. Against this backdrop, a well-researched and profound debate is essential. It is the only way in which solid concepts and ethical parameters necessary for a responsible future biomedical course may be developed. Therefore, this volume will focus on the topics of medical enhancement and posthumanity. Both topics are treated along the same general lines. The issues are first analyzed from an historical and a conceptual perspective. Against this backdrop then follow both a positive as well as a negative ethical assessment.

Authors well known for their favorable or critical views on enhancement and post-humanity try to make their strongest possible case. Finally, the issues of medical enhancement and posthumanity are discussed as and to the extent in which they appear in specific fields such as cosmetic surgery, biogerontology, germ line genome modifications, bioelectronics and NBIC converging technologies.

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# **Part I**

## **Medical Enhancement**

# **Chapter 1**

## **The History of Medical Enhancement: From *Restitutio ad Integrum* to *Transformatio ad Optimum*?<sup>1</sup>**

**Urban Wiesing**

### **1.1 Introduction**

The subject of medical enhancement has received growing attention over recent years predominantly due to the developments in the fields of biomedicine and to technological possibilities. This could lead erroneously to the assumption that the subject itself is new and that human beings are considering for the first time how they might improve themselves. This is not the case. The idea of human optimization and self-perfecting is not new. Human beings, as far as we can judge from the historical sources, have always been interested in creating or bettering themselves, and have always intervened in their own reproduction. The practical measures and theoretical concepts involved in enhancing human beings have, however, transformed considerably over the course of history. Presented below is an overview of the topic together with several important key conclusions, drawn from selected authors and related examples pertinent to the discussion.

### **1.2 Antiquity**

In Antiquity, medicine was based on the idea of the healthy human organism as a well-ordered microcosm. If its order, or the configuration of its individual components, became disturbed (if, for example, the ‘good ratio between the humours’ became imbalanced) this would then be the cause of disease. The task of the physician was, therefore, to reinstate the original order, the *eucrasia* of the human microcosm, and thus cure the disease, according to the concept of *restitutio ad integrum*. “What you should put first in all the practice of our art is how to make the patient well” (Page et al. 1959: 78). According to the theory of the four humours, eucrasia is a balance of the bodily liquids, with any possibility of enhancement neither presumed nor suggested. One could attempt to transform dyscrasia into eucrasia by

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<sup>1</sup>The author thanks Johannes Brachtendorf, Ruth Chadwick, Bert Gordijn, Diane Kerns, Karl-Heinz Leven, Julia Peterson and Richard Toellner for their help.

way of treatment, but eucrasia was itself not a condition that one could surpass; a *restitutio ad integrum* was a *restitutio ad optimum*.

This represents an understanding of medicine as an art, as a *téχνη* (*téchne*). According to the theory of Aristotle (384–322 B.C.), which was considerably influential over a long period of time, *techne*, and thereby medicine as well, is a human activity that in a special way imitates nature. With nature as such being the model, art (or *techné*), following this model, will strive toward its inherent *entelecheia*. “[A]rt in general imitates the method of nature” (Butcher 1927: 117). For this reason, the range of active possibilities for the human being within the framework of an Aristotelian *téχνη* is limited, and the direction of his or her activities is already preset by nature. “The human being, in his work and activities, places himself in the consequence of physical teleology: he brings about that which nature would bring about, nature’s [...] immanent being as it ought to be” (Blumenberg 1981: 73). Appropriately understood then, achievement beyond the dictates of nature is not intellectually feasible, and this pertains as well to any alteration of the human being. The mimesis principle, according to Aristotle’s definition of art (*techné*), has had a lasting effect upon European intellectual history.

In the religious and moral sense as well, the human being in the time of Antiquity could only strive toward self-improving from within a preset framework. According to the regulatory concept of ‘becoming like a God’ – ὄμοιόστις Θεῷ (*homoiosis theo*) – a fundamental kindred of spirits exists between the human and the divine. The task of the soul is to maintain this kindred spirit during its lifetime on earth, that is, during its time away from God. If the soul is successful in this mission, it can reunite with the deity – its origins – once the human being it has been occupying dies. Plato (427–347 B.C.) adopted these teachings and developed them further. According to Plato, *homoiosis theo* can only be realized through philosophy, by recognizing the divine in ideas. In his view, a human being who has become similar to God is a just human being, because the gods themselves are just par excellence (Plato 1988: 352a–b). The *homoiosis theo* imposed upon people finds its expression in the development of the virtue of justice. Plato’s image of human perfection thus included a moral component as well (Plato (1967; see Köing 1996). And philosophy, not biology, serves as the method by which humans are then capable of perfecting themselves. The limitations of *homoiosis theo* are twofold: firstly, the divine model cannot be augmented; secondly, the human being can only strive toward this image within his or her limited realm of possibilities, κατὰ τὸ δυνατόν, as far as this is possible (Platon 1946: 176a–b).

Within the further course of history, the idea of *homoiosis theo* assumed various philosophical and theological manifestations. Remarkably, the notion of human improvement associated with *homoiosis theo* remained firmly linked to the realization of moral virtues, just as it had been in the time of Plato and at the height of Christianity.

In classical antiquity, measures were known, e.g. infanticide, which would have been used to control the number as well as the quality of offspring. Several regulations of infanticide and references to it in the literature of classical antiquity indicate that infanticide was most probably performed in many societies of that time period.

Aristotle thus argues in *Politics*, “As to the exposure and rearing of children, let there be a law that no deformed child shall live” (Aristotle 1988: 7th Book, 1335b 19). Plato asserts this as well in the *Politeia*, in which he demands, in terms of selection of children after birth, the following, “Well, I suppose they’ll take the children of good parents to crèche and hand them over to nurses (who live in a separate section of the community); and they’ll find some suitable way of hiding away in some secret and secluded spot the children of worse parents and any handicapped children of good parents” (Plato 1988: V 460 c; see also 460a–b). Further, we find in Plato’s *Politeia* the eugenic concepts for breeding: A state must make sure that “sex should preferably take place between men and women who are outstandingly good, and should occur as little as possible between men and women of a vastly inferior stamp. It also follows that the offspring of the first group should be brought up, while the offspring of the second group shouldn’t. This is how to maximize the potential of our flock” (Plato 1988: V 459 d). The biological pursuits involved in improving the human being draw upon groups within a state and are implemented by means of breeding. They remained as such within the possibilities predetermined by nature itself.

### 1.3 The Middle Ages

During the Middle Ages, the idea of *restitutio ad integrum* was compatible with the dominant notion that God created the world and all the creatures in it according to His omniscient conceptions. Since the whole of creation was regarded as perfect – being, as it was, of divine origins – human beings, as the pinnacle of creation, were also regarded as fundamentally and naturally perfect, not in the sense of a perfection alone pertaining to God but in the sense of the form of the created human being. “All natural things were produced by the Divine art, and so may be called God’s work of art. Now every artist intends to give to his work the best disposition; not absolutely the best, but the best as regards the proposed end. [...] Now the proximate end of the human body is the rational soul and its operations; [...] I say, therefore, that God fashioned the human body in that disposition which was best, as most suited to such a form and to such operations” (Aquinas 1948: quest. 91, 3). Medieval man viewed disease as a deviation from natural perfection. The fact that diseases could befall fundamentally perfect human beings was attributed to original sin and its repercussions: an erring of ways or possession by evil spirits. The process by which human beings might recover from their sufferings was equated with the resurrection of mankind on the Day of Judgement. According to Medieval precepts, earthly recovery to some extent pre-empted heavenly resurrection. *Restitutio ad optimum*, which means *restitutio* according to Gods plan, was, however, only possible in the life after death, and only through the mercy of God.

Any thought of human beings reaching beyond the preconceived plan of God in order to improve themselves did not occur, as nothing was capable of surpassing God’s plan. It would have been unimaginable and would also have endangered the image of God if one wished to improve human beings beyond what was a condition

pre-determined by God. This condition was optimal and binding, even when it could never be fully obtained in a person's lifetime due to original sin. One should not forget that the medieval efforts toward human self-improvement or perfecting are less concerned with the biological aspects; rather, these efforts were much more focused on the intellectual and spiritual side of human beings. By concentrating on the healing of the soul, one spent less time questioning the physical health of a person. The notion of *restitutio ad integrum*, therefore, contained not only medical but theological significance as well.

These are the ideas found, for example, in the work of St. Augustine (354–430). He described the notion of an “integrum” as “peace” (pax) and extended this peace to correspond with the integrity of the body, to the relationship between body and soul, between human beings with one another and between the human being and God. “The peace of body and soul is the ordered life and health of a living creature; peace between mortal man and God is an ordered obedience in the faith under an everlasting law” (Augustinus 1957–1972: Book XIX, Chapter XIII (p 175)). According to Augustine, this peace is a characteristic of the natural order, an optimum established in God's all encompassing design. The opposite of peace is turmoil, which is an unnatural condition expressing itself in the form of physical illness. Peace as the best of all conditions cannot, though, be completely found on earth due to the sins of “man.” At best human beings will know peace as a *pax temporalis*. In order, though, to attain the most substantial form of earthly peace, God has made certain means available to human beings. In applying these means to acquire the peace, a *pax mortalium*, accorded to mortal men, human beings are paving the way for the eternal peace, or *pax immortalitatis*, to be found in a later life. For only in the resurrection can the absolute integrity of eternal peace be re-established for the just or good human being.

“God, then, the most wise creator and most just ordainer of all natures, who has set upon the earth as its greatest adornment the mortal human race, has bestowed on men certain good things that befit this life; to wit, temporal peace, so far as it can be enjoyed in the little span of a mortal life in terms of personal health and preservation and fellowship with one's kind, and all things necessary to safeguard or recover the peace (such as [...] light, speech, air to breathe and water to drink, and whatever befits the body, to feed or to cover it, to heal and adorn it); all this under the most just condition that every mortal who rightly uses such goods, that are designed to contribute to the peace of mortals, shall receive larger and better goods, that is the peace of immortality, and [...] an everlasting life spent in the enjoyment of God” (Augustinus 1957–1972: Book XIX, Chapter XIII (180–181)).

## 1.4 The Modern Age

The ideas concerning human beings and their possible alteration changed decidedly through the developments of modernity and the scientific revolution, which thus transformed the concept of *restitutio ad integrum* into *transformatio ad optimum*.

With the beginning of the Modern Age, a transformation took place regarding how one understood Nature, human beings and the possibility of human intervention; a creative self-confidence slowly emerged. The mimesis principle from Aristotle's concept of *techne* lost its strength while the creativity of human beings was discovered. Along with technical improvements, a "historical, and by no means obvious, link between achievement and self-confidence" (Blumenberg 1981: 58) developed. Beginning with Anatomy and Physiology, the concept of human and of the possibilities of intervention became transformed. Whereas the people of antiquity viewed themselves as a well-ordered microcosm, and medieval people as the pinnacle of God's creation, modern people saw themselves in many different ways, more like a machine, in a technical sense, and finally as the flawed result of chance evolutionary processes.

In the 16th century, Paracelsus (1493/94–1541) described the production of a small human being, a Homunculus, in his work "De Natura rerum" from 1537. Technical possibilities offered new means for Alchemy: "The propagation of all natural things is twofold: the first being that which is derived from nature without any art, the second that which is derived through what is art, namely through alchemy" (p 312). An artificially created human being could exist when human sperm was kept in a glass flask along with horse dung at a constant warm temperature, "until it becomes a living thing, and is moving and stirring" (p 317). This living being was to be nurtured over time under specific conditions so that Homunculi might develop. These "will become giants, dwarfs, and other types of great wondrous beings, who will become useful as mighty tools and instruments" (p 317). Due to their artificial origins, their abilities could also surpass human standards so that "with their strengths and deeds they will more resemble ghosts rather than human beings" (p 317–318).

Paracelsus' description of the creation of a Homunculus, Paracelsus (1928), a being similar to a human and conceived through alchemy, was read by later authors, especially during the time of the Enlightenment, as superstition. Alternatively, René Descartes (1596–1650), in the tradition of Iatromechanics, understood an organism as a machine that could be described completely through physical laws. Nature was no longer a well ordered cosmos but rather a well-functioning machine, for the most part. One had to proceed thus in the treatment of people. As such, the theoretically conceived possibilities were broadened by means of creative intervention in the structure of a machine.

As a consequence of the success accompanying the natural sciences, the idea prevailed that Nature can be influenced. Within this transformation of ideas concerning Nature, the means of approaching Nature, as well as the means for grappling with human nature, changed dramatically in the modern period. New methods, through observation and scientific experimentation, changed the approach to Nature. Nature was held to be an object that could be recognized simply through the methods of natural science. Nature was to be revealed through precise observation and experiment. The possibilities for intervention became in principle unlimited, with science, through its departure from religious and other traditional terms of reference, ridding itself of its own limitations, even when overriding these

limitations was at this point merely theoretical. In turning away from the Aristotelian understanding of techne and the associated mimesis principle, a tendency developed “away from the dependency on the imitation of nature, while pushing forward from nature into the untrdden realm” (Blumenberg 1981: 83). The cosmos harbours within itself a multitude of possibilities, which stand fundamentally open to people and which through technology can be in effect realized. This theoretical notion became, at least for some authors, a reason for euphoria.

A striking example of a philosopher of the Enlightenment is the Marquis de Condorcet (1743–1794). His optimism with regard to progress extended as far as the possibility of influencing human nature. In his “*Esquisse d'un tableau historique des progrès de l'esprit humain*” from 1794, Condorcet proposed “that nature has set no terms for the perfection of human faculties; that the perfectibility of man is truly indefinite; and that the progress of this perfectibility, from now onwards independent of any power that might wish to halt it, has no other limit than the duration of the globe upon which nature has cast us” (Condorcet 1794: 4). He applied this historical-philosophical plan to all areas of human life in order to pose the question of whether this could pertain to the biological perfection of the human being. His answer is affirmative: “Organic perfectibility or deterioration amongst the various strains in the vegetable and animal kingdom can be regarded as one of the general laws of nature. This law also applies to the human race” (Condorcet 1794: 199). Condorcet focused especially on drastically increasing longevity and on the radical reduction of disease through progress in the sciences and the political application of scientific findings. Furthermore, he believed that newly acquired and improved moral and intellectual capabilities could then be inherited.

Medical practitioners are by rule more cautious with regard to the enhancement of human beings. The physician Christoph Wilhelm Hufeland (1762–1836), in his famous work “*Die Kunst, das menschliche Leben zu verlängern*” (The art of prolonging human life, 1796), does not see any possibility in “bringing about change to the grand scheme of nature” (Hufeland 1796: 55) but rather sees at best that the lifespan prescribed by nature could be lengthened through a healthy way of life and through “*künstliche Mittel*” (artificial means). Nature grants a certain amount of “*Lebenskraft*” or *vis vitalis* (vital power) to human beings. When this amount is consumed then each living creature will die. By being careful with the *vis vitalis* and taking certain pains in rejuvenating one’s vitality by, for example, getting enough sleep, human beings may be able to lengthen their lifespan, but no more. This is also a point of view shared by Immanuel Kant (1724–1804) in his “Conflict between the Faculties” of 1798.

Long before the technical realization of human enhancement, literary authors took up the subject. Examples are mentioned here to serve as evidence of the transformation of theoretical conceptions. One of the most influential examples is the novel “*Frankenstein or: The Modern Prometheus*” by Mary Shelley (1797–1851), published in 1818. A scientist, Victor Frankenstein, creates a new human being with a method that he develops out of an almost self-destructive ambition. He accomplishes it not through breeding or through the creation of a machine, but out

of body parts and through a new method, electricity. For all of this, the creator of the new human is exclusively thankful to science: “Some miracle might have produced it, yet the stages of discovery were distinct and probable. After days and nights of incredible labour and fatigue, I succeeded in discovering the cause of generation and life; nay more, I became myself capable of bestowing animation upon lifeless matter” (Shelley 1951: 45–46). Limitations within the scientific findings or with regard to the exertion of influence did not exist for Frankenstein, but rather the opposite: he praises himself, in the spirit of the Enlightenment and in the optimism felt for technology, as the means for bringing light into the darkness of the world. “Life and death appeared to me ideal bounds, which I should first break through, and pour a torrent of light into our dark world” (Shelley 1951: 47). The scientist Frankenstein is furthermore convinced that he is benefiting humankind with this attitude and with his creation. During the creation of his new human being, he is not befallen with any notion of skepticism concerning the results of his actions. “A new species would bless me as its creator and source; many happy and excellent natures would owe their being to me. No father could claim the gratitude of his child so completely as I should deserve this” (Shelley 1951: 47). But the catastrophic course of events that follows the invention is well known: The newly created being possesses a personality, desires love, warmth and security, but is an outcast among people who find his monstrous appearance too hideous. Out of revenge the monster kills the family and friends of his creator. Victor Frankenstein pursues his creation also out of revenge, and in doing so finds death.

## 1.5 Evolutionary Theory

The varying ideas from the modern period concerning nature and its influence on human self-awareness were once more surpassed through the theory of evolution from Charles Darwin (1809–1882). As a result of the theory, the human being becomes the product of chance in the course of evolution. This product is not perfect but rather, in all manners of speaking, deficient and predisposed to further deficiencies in relation to the evolutionary challenges. The boundaries demarcating categories of species became accidental products of history, while new, even altered species could come into being. This knowledge was, on the one hand, a threat. The human being, his genus or a specific race could change for the worse, degenerate and even become extinct. The decadence of human beings and their societies were a topic often discussed, especially at the end of the 19th century. People believed themselves to be threatened with decline. On the other hand, the theory of evolution allowed for the possibility of improvement above all in connection with future scientific means. The characteristics, which placed humans in a specific genus, were no longer fixed and were therefore fundamentally flexible, open to our disposal. One could improve human beings – and not only a few believed that one must change human beings alone due to the supposed fact that civilization had become altered, was now anti-selective and therefore promoting degeneration. “The

man-made – aesthetically as well as technically – with all its necessity presented itself to the randomness of natural formations” (Blumenberg 1981: 89).

## 1.6 Eugenics

When above all the field of molecular biology, and particularly genetics, is currently being associated with the bettering of human beings, then this is not being done, historically understood, for the first time. “The current revolution in molecular biology is not the first but the second large-scale attempt to modify the pattern of human heredity for the better. The eugenics movements of 1870–1950 came first” (Buchanan et al. 2000: 27–28; see Weingart et al. 1992).

The founder of eugenics, Francis Galton (1822–1911), a cousin of Charles Darwin, defined it in 1883 as the “science of improving stock, which is by no means confined to questions of judicious mating, but which, especially in the case of man, takes cognisance of all influences that tend in however remote a degree to give to the more suitable races or strains of blood a better chance of prevailing speedily over the less suitable than they otherwise would have had” (Galton 1973: 17). The Darwinian theory of evolution was the prerequisite for the eugenic movement.

Conceptually, eugenics is, in the contemporary world, understood negatively due above all to the eugenic politics under National Socialism. One should, however, not forget that in the first half of the 20th century there were many different eugenic movements, not only in Germany. Many civilised countries incorporated eugenic thought into their political agenda and, as an example of this, limited the immigration of particular population groups. There were more or less influential eugenic societies in many countries. Liberal and left-leaning political parties also argued from a eugenic point-of-view, not only the political parties tending toward the right. With its broad resonance as a social and political response to various issues, the eugenic movement of the 19th and 20th centuries was different from all previous but similar movements propagating eugenic thinking. Supporters of eugenics wanted to incorporate their utopian vision into the realm of politics (see Plötz 1911a, b).

The varying eugenic movements were striving toward different goals. Should one hinder “bad” offspring (negative eugenics) or should one encourage the propagation of people with a better genetic inheritance (positive eugenics)? The question of which measures should be implemented also brought on varying responses. Should one support only wished for propagation, should one encourage voluntary abstinence with regard to unwanted propagation, should one force the copulation of people with a “good” genetic structure and prevent by force unwanted propagation, or should people with a bad genetic make-up be eliminated?

Despite these differences there were some common views within the eugenic movements. They all follow, in broad terms, a biological approach. They assume that behaviour and the personal characteristics of human beings are overwhelmingly conditioned by hereditary and that the quality of the genetic make-up of the population in civilised countries is deteriorating due to unnatural conditions that impede selection.

As a response to this assumedly avoidable degeneration, the eugenic movement wanted to see a greater representation of certain types in the gene pool, types which were thought to be “better”. In order to accomplish this, it is not only necessary but also legitimate to limit individual freedom. The eugenic movement has then stood in perpetual conflict with the protection of individual freedoms and human rights.

The eugenics movement has faced constant criticism and was accused of being a misguided science, not only after the moral catastrophe of National Socialism. In scientific terms, it has been doubted whether there is proof that the gene pool in civilised societies is deteriorating and that degeneration is now a threat (e.g. Raymond Pearl 1879–1940; (see further Pearl (1928a, b)). Accordingly, the fundamental question was raised concerning the criteria for determining what is good and desirable and what is bad and undesirable. Furthermore, eugenics has been criticised as non-scientific for applying valuations that do not pertain to science (e.g. Max Weber 1864–1920; see Weber 1911). A science is not capable of answering the moral question, to what end a gene pool should be manipulated. And in no lesser terms, eugenic measures have also been criticised from the perspective of humanism and individual rights (e.g. Friedrich Hertz 1898–1965; see further Hertz (1916–1918)).

The history of eugenics reached its political high point, and its moral low point, with National Socialism in Germany. Here we see clearly what it means to find the peculiarly horrific consequences of biological thought becoming part of a political agenda. Initially, “hereditarily defective” offspring were prevented through legally based forced sterilization; afterwards the separation of the races was controlled, then handicapped and mentally ill individuals were murdered and finally the Jews faced extermination. The presumably worst crimes of humanity were based on the absurd eugenic thought that one saves his own race through the extermination of another. Also, within the SS, a breeding program existed with the aim of creating a higher quality of racial offspring.

## 1.7 Eugenics After 1945

After National Socialism, the attempt to improve the quality of the gene pool of a particular group through forced measures, along with the acceptance of human rights’ abuses, has been a taboo subject in the Western world. At the same time the eugenic intent in several immigration laws was not changed immediately after 1945, and particular elements from eugenic thought have been maintained, even when forced implementation is discussed only with great reserve. The CIBA Symposium in London of 1962 is described below in order to present in precise terms eugenic thought and a “modern” scientific identity.

Assembled together were 27 high-ranking scientists (among them six Nobel prize winners) who were addressing the threats of both over-population and atomic warfare; they considered their situation to be that of facing a challenge which was to be confronted by one means alone: “Most of the authors backed without qualification a scientific solution to the problems” (Wieser 1966: 10). One of the reasons for the

inappropriate response to the scientifically-induced challenges discussed at the symposium was the quality of human beings themselves: “The challenge is man’s obvious imperfection as a psychosocial being; both individually and collectively, he is sadly in need of improvement, yet clearly improvable” (Huxley 1963: 4).

Through science, especially through the theory of evolution, human beings find themselves in the peculiar situation that they alone have before their eyes the true history of the universe and they alone know the true path: “We are privileged to be living in a crucial moment in the cosmic story, the moment when the vast evolutionary process, in the small person of enquiring man, is becoming conscious of itself” (Huxley 1963: 1). On the one hand, science recognizes that the form of the human being is capable of being transformed; on the other hand, the human being (at least the smarter ones, in particular the participants of the symposium) perceives the crisis. Therefore, it is necessary to alter the human being.

This conclusion does not exclude eugenic measures: “Our present civilization is becoming dysgenic. To reverse this trend, we must use our genetical knowledge to the full [...]. Eventually, the prospect of radical eugenic improvement could become one of the mainsprings of man’s evolutionary advance” (Huxley 1963: 21). The majority of scientists participating at the CIBA Symposium spoke in favour of eugenics. They discussed in particular the practical difficulties that arise in liberal and democratic societies. What limitations to personal freedom could be deemed acceptable? Could one attain the eugenic goals through education as well? Some of the participants were in favour of selective fertilization through sperm donations, as well as direct intervention in genetic material to enhance future offspring.

Although the CIBA Symposium was a small meeting of high-ranking scientists, it did present a poignant example of a self-immunising science and a paradigmatic style of argumentation. According to most of the participants of the meeting, science has contributed to the existence of a crisis because it has invented technology (medical and atomic) that is then causing the crisis. By way of evolutionary theory, scientists have recognized the crisis as a degenerative one, and have recognized the present make-up of human beings as being insufficient in abating the crisis. The scientists believe in the necessity of altering human beings, have proven the transformation of human beings in evolutionary theory, and are able to present the means for overcoming the crisis. According to this view, science is being impaired above all by traditional moral considerations – and those who do not realize this are, of course, not scientists, and therefore misguided.

Science as such becomes the final determining force; science alone is responsible not only for causing but also for eradicating the problems. The improvement of human beings through the means of biological applications becomes here a scientific necessity and can be advanced through scientific means in a goal-oriented manner. And in view of the level of difficulty of the problem, intervening in the rights of individuals is “the least of all evils” (Wieser 1966: 24).

Interestingly enough, the central opposing arguments at the conference were also pointed out: has it in any way been proven that genetic degeneration in civilized societies exists? Is there a crisis in the first place? And who produces the standards to evaluate this? Also, the cognitive theoretical difficulties, already long known,

were mentioned: how can evolutionary theory, as well as other scientific theories, determine the goals that are to be followed? Would this not push scientific theory beyond its own limitations? (See discussion in Wolstenholme 1963: 274–298).

## 1.8 Medicine in the 21st Century

The eugenic theses presented at the CIBA Symposium are, in this form, no longer brought up today. But the challenges have since then become more acute and the technical possibilities through biomedical progress have gone through further expansion. This progress is advancing at a faster pace than ever before with the result of an “exponential acceleration of progress and growth” (Kurzweil 2005: 32). Never before have so many people collected, with the most complicated of technologies, so much knowledge about human beings and about possible interventions in the human body. In particular, the transformation of bio-medical inventions into a marketable product is occurring under a more stringent rationality and within a tempo never known to have existed before. This is historically significant: In times past, even in times of scientific progress, there has been “no proclaimed notion of a future determined by constant progress, and even more important, hardly a deliberate method worked out for its implementation, such as regards research, experimentation, means for risk-involving and unorthodox trials, a far-reaching exchange of information, etc.” (Jonas 1985: 18). Constant progress has become a fundamental condition of life and work. This leads to the new historical situation that human beings must prepare themselves through the course of their lives for completely new technologies, since within one generation technical innovations will massively alter their lived-in world. It is understandable that this could lead initially to apprehension and fear in those who are affected.

Technical development, with its ever-growing and seemingly unlimited possibilities, has in turn had a stimulating effect on public euphoria. First, it appears technically possible in the near future to alter the human being for the – alleged – better through directed medical means, and not only for the sake of her descendants but rather during her own lifetime. While medicine and its possibilities were still severely limited up into the 20th century, many ideas concerning the altering of human beings are no longer simple illusions but have become seemingly possible in their technical implementation, in particular through the combination and convergence of technologies. While the medical dimensions of Utopia from the previous century were still theoretical speculations over a distant future, those dimensions of more recent utopias have become exact prognoses, drawn from concrete technologies as, for example, with regard to genetics or Man-Machine-Interfaces (for a summary, see Gordijn 2004). But the euphoria is by no means without its shadowy side. Along with the optimistic visions of the future we find horrific depictions of this same future as well. These were manifested already in the 20th century in the negative utopias of a totalitarian society, in which cloning technologies are implemented to control reproduction completely, as for example in Aldous Huxley’s (1894–1963) *Brave New World*.

This increase in the range of medical activity has resulted in the intensive way in which the medical profession in the Western world tends to be closely involved in the lives of people – from the moment they are born until the moment they die. Many areas of daily life such as unusual behaviour, sexuality, aesthetic appearance or performance at school have become more and more “medicalized” for the first time in the history of humanity, placed under the responsibilities of medicine and described as medical issues. No longer is the priest or a family member responsible for certain problems, but rather the doctor or therapist. In addition, the achievements of modern medicine in many industrial countries are financed by insurance institutions and made accessible to the general population.

New to the present situation, from a historical perspective, is the emphasis placed on the methods from the biomedical fields. These methods are viewed as having the most potential for improving human beings. They are applied in many areas, not only in medicine, but also, for example, in pedagogy, through the use of pharmaceuticals to improve learning results. This can also be found in varying degrees, and for other aims, in sport or in the use of lifestyle drugs. Mainstream science hopes to generate the best possible success by way of biomedical methods, for example, in improving general capabilities in social behaviour, intelligence and concentration, to name only a few. Furthermore, one hopes to find improvement in specific qualities or attributes. The ‘holistic’ moral improvement of a human being through, for example, philosophy, or the training or the refining of moral behaviour, is currently hardly considered. Old methods such as spiritual or moral improvement through belief, meditation, and prayer or through the training of moral behaviour are seen as the goals of isolated, often religious-based groups. Medicine, within its possibilities, has more and more become an influential societal phenomenon. All of this – understood historically – is very new.

By the technical possibilities the aim of a *transformatio ad optimum* gets numerous facets, each raising different ethical questions: One can try to enhance, or even optimise, single partial capacities of a human being, several partial capacities or even the whole human being. And it has to be determined what the *optimum* of a human being is or whether there are several *optima* – an answer to this question is far from being trivial. Due to the variety of answers to be expected the *transformatio ad optimum* will become a *transformatio ad optima* and therefore in its practical realisation a *transformatio ad infinitum*.

Along with the known methods toward medical enhancement through pharmaceuticals or controlled reproduction, two technological approaches are above all making possible a new dimension in intervention: the direct intervention in the genetic material and the direct connection of the human being with a machine.

## 1.9 Modern Genetics

The possibilities of intervention through the technological developments in genetics have broadened dramatically when compared to “classical” eugenics. The possibilities of controlled reproduction, already discussed by Plato, are being well surpassed.