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QUO VADIS
HOMO SAPIENS?

Ethical Positions concerning
Genetic Enhancement of the
Human Brain

Global Society Press
To my girls

Brenda, Alexandra and Natalie
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PROLOGUE: A FEW PIECES OF FICTION
Fiction One: Luckyboy

(USA, 2040)

The following notes were written by Dr. John A., a retired genetics professor from the University of Phoenix, Arizona. These notes were found in his private files after he died in 2080 at the age of 105. He had never shown these notes to anybody.

May 09th, 2040

I had a very strange visitor today. A young man was here who said he would come to me because of an article that I had written some 15 years ago about how a „transhuman“ person (a human being that had been genetically altered considerably) might feel. He said he liked the empathetic tone of the article and that he needed some advice. I told him that I was retired, but we talked anyway.

He claimed to be a transhuman person himself and that he had come to me for three reasons:

First, one of his brothers – allegedly also transhuman - was very sick and needed my help. From the description it sounded as if he had some kind of tumor of the skull bone that I had never heard of before.

Second, other siblings of his also had problems that allegedly were due to poor genetic design.

Third, he and his brothers and sisters were not registered as U.S. citizens. This had never been a problem, but due to a new law the banking industry will be allowed to use the biometric data stored by the government to verify the identity of any individual for bank business like money transfers from next year on. Thus, anyone not registered would no longer be able to open an account or withdraw money out of an existing account. For this latter problem I gave him the address of a lawyer because I knew nothing about the handling of it. Maybe this was the real reason for his visit? Maybe he was just an illegal immigrant? He spoke perfect English and his accent could have been educated East Coast, but I am not sure.

I asked him whether he could provide me with some evidence of his story and of his transhuman nature. Strangely, he had not foreseen this question
and told me that he would consult with his brothers and sisters and would come back to me. We agreed that he could visit again tomorrow at 10 a.m.

Observations: He was in his mid to late twenties. He had a few strange features but nothing that I would consider outside the range of normal variations of Homo sapiens. His skull seemed to be quite big and his neck was so strong that from his shoulders upward he looked a little bit like a wrestler but with a very nice and likeable face. He was modest, polite, soft spoken, had a nice smile, very intelligent eyes, and was not very tall with a slim and dynamic body. Strangest of all was that he showed no sign of sweat. The air conditioning had broken down in my house and I was melting with temperatures well above 30 ° Celsius.

He introduced himself with the name „Luckyboy“ – evidently his first name. He did not give me a last name.

May 10th, 2040

Luckyboy did not show up so this must have been just a strange story of an illegal immigrant.

May 12th, 2040

Luckyboy called! He asked me whether I would like to visit him and his brothers and sisters in their house this afternoon. They are a two hour drive away from my house, Luckyboy will pick me up. I agreed hesitantly. These notes will go automatically to the police by e-mail unless I cancel the automatic forwarding by tomorrow morning 9 a.m.

May 13th, 2040

The visit to Luckyboy’s house yesterday was a mind boggling experience. There were three women and three men including Luckyboy, all of whom seemed to be in their mid twenties. They live in a huge mansion so they must be multimillionaires but I could not really find out how they had made their money originally. From the mansion they manage various investments and other online businesses, seemingly big ones.

They explained to me that the creators of their „species“ were a group of scientists who had started working on their secret project as early as 2005. This did not happen in the United States, but they did not want to tell me which country it was or where those scientists were now. This clandestine project group performed illegal cloning- and genetic engineering- experiments with human material and from what I heard it became clear that there must have been many thousands of experiments, most of them a failure and the result-
ing creatures were „destroyed.“ The group made three major discoveries in the course of two decades of unrestricted, secret and (at least according to U.S. laws) highly illegal empirical research:

First, they succeeded in developing an artificial womb and were from then on independent of finding a woman who would have the transgenic fertilized egg cell implanted into her uterus and then give birth to the matured embryo.

Second, the genetic code for the speed of development in human childhood was found and they managed to alter it in a relatively early stage. The number of years to reach adulthood was manipulated to be some two to three years and not some twenty years as with regular Homo sapiens. Thus, the results of any other genetic manipulation could be observed and improved within a few years instead of a few decades.

Third, experiments with artificially combined DNA were more and more successful, providing independence from acquiring the right base material for the next generation of clones.

The six person group showed me around in what they called their „reproduction laboratory“ and it became clear to me that they are genetically autonomous and fully independent from the rest of the world. Their claim to be a new species does have some foundation, even though the thought is very unusual to say the least! They showed me their artificial wombs in which they were just breeding three new children that were produced by combining artificial DNA that was then injected into artificial chromosomes. The egg cells were then placed into the artificial wombs that looked a little like deformed basketballs. Luckyboy told me that he was born this way too and he claimed to be three years old.

All the knowledge necessary for the complicated genetic procedure was evidently present in the memory of each of the six persons I met. They all must have had huge memory capacities and very high intelligence. They all had skulls that were just a little too big compared to their bodies; they all had the bulky neck that they needed to keep the additional weight straight up. I would not say that they were exactly handsome. I had the impression that they did not have a lot of contact with the world outside their huge property. They had a pond, a fitness center and other facilities on their 50 acre piece of land in the middle of the desert, so there was no immediate necessity for them to go outside. They mostly communicated over the Internet and by telephone to avoid direct contact with other people. Their behavior
was a little strange, and in spite of their intelligence they seemed completely naïve in certain ways. They lacked intuition - this would probably be the most precise way of describing this. Never did I feel threatened or in any kind of danger, though. They did not seem to be capable of aggressive behavior at all, they reminded me a little of what I had read about the hippie communities that existed some 70 years ago. Even though they seemed perfectly happy and lived under very favorable economic conditions, I could not help feeling a little sorry for them in a way. They recognized their outsider status sufficiently to be shy and to always feel slightly threatened.

Besides, they had health problems to deal with. One of Luckyboy’s brothers – he looked like a teenager, but they told me he was only a little over one year old – had a completely deformed head. His brain was growing slightly faster than his skull and they had performed several surgeries in which they had opened his skull, extended it and put a piece in to give the brain more space. I could not find out whether this surgery had been performed in a hospital, but can hardly imagine it was performed here in the hidden life of this group. Could it be that they had done this themselves? The poor guy was almost blind because the ever-growing brain had started to squeeze the optic nerves that connect the eyes with the vision center of the brain. He was hardly able to eat and Luckyboy explained to me that this would probably lead to his death within the next few weeks. The fast growth that they had genetically engineered had as one of the consequences an enormous need for food input. The whole digestive system including the mouth, teeth, stomach, bowels, blood circulation, etc. all had to be able to process the constant eating. Luckyboy said he was partly brought up with artificial nutrition constantly flowing into his veins but the mixture they had used had not been quite right so he suffered from a somewhat weak bone structure. One of Luckyboy’s sisters told me that her eyesight did not function properly. There were hours, sometimes even days, were she would see everything in shades of blue, sometimes the same thing happened in shades of red. „It drives me crazy,“ she said and laughed a lightheaded laugh that was in contradiction to the description of this serious handicap.

Those health problems were the main reason why they had contacted me. To summarize our talks: They feel that they need help from „Homo sapiens research institutions“ in order to fix their defaults that were clearly of genetic origin. They had no clear idea whether this would be possible and neither did I. They have enormously advanced genetic knowledge – after all, all the results of decades of illegal experiments probably make them the
world elite in human genetics. If they cannot fix certain problems, is it realistic to assume that any other research institute could? They declined to give me a probe of their DNA and I realized that they had taken all kinds of precautions so that I would not be able to obtain a hair or a skin cell of any of them to be able to take home a DNA probe without authorization.

I still feel flattered by their trust in me and feel obligated to help. Besides, I must admit that my researcher instinct is awake – I would love to know more about these strange creatures that are definitely humans. I promised to think about everything and to get back to them within the next four or five days. How could I help them? Going public would attract all kinds of professional help, but also the nasty attention of the media. I have to think about this some more.

*June 5th, 2040*

I just came back from the house of Luckyboy and found out that he and his siblings have moved out. The house is completely empty and nobody knows where they went. May 14th, two days after my visit with them, I collapsed over breakfast after I had spent another night in my house without air conditioning. This was three weeks ago!!

I was brought to a hospital and had to stay there for over two weeks. Consequently, I was not able to contact Luckyboy as I had promised. I wonder where they are now. Should I pursue them? Should I go to the police and report everything even though this might mean that I destroy their anonymity?
Dear Mrs. B.,

Thank you for having met with me in person yesterday and thank you for allowing me to write this letter to you. But, above all, thank you very much for your promise to keep this information absolutely secret from anybody except for the Prime Minister himself.

I will try to summarize what I already told you during our conversation.

On June 10th of this year, a citizen of the Philippines came into our consulate in Hong Kong and requested protection and the status of a refugee. We do not give such status to citizens of the Philippines but nevertheless our political analyst interviewed the person after he had identified himself as a „military scientist“ of the Philippine armed forces. He claimed to be part of a research group that operates within a Philippine military facility and focuses on genetic manipulation of human embryonic stem cells. Our staff in Hong Kong called me and asked me to be available for further interviewing of this person who then traveled to London.

We – a group of seven specialists including our top genetics specialist of the army hospital in Brighton - had numerous interviews with this person and came to the conclusion that his story is authentic. This is the summary of what we learned:

Two years ago a special unit of the Philippine’s armed forces medical corps was formed and equipped with a budget of several hundred million dollars and a building suitable for biotech research. They were provided with several tens of thousands of human egg cells and an even greater number of sperm cells provided by soldiers. The task given to them was to find the genes that were responsible for the predisposition of the brain that causes an individual to resist decisions made by other people and to develop an autonomous mind, self-esteem and „free will.”
As I explained to you during our meeting, the physical basis of our mental independence has been researched for a few decades now and the results are quite well known in today’s scientific community. To put it in simple words: mental autonomy does have to do with intelligence, but not exclusively.

Indeed it seems that the structures that enable us to develop our own ideas and the willingness to pursue the decisions thus generated are not as complex as we used to think a few decades ago. The genetic codes and environmental conditions that lead to the formation of those physical structures of the brain are not yet completely known, but are being researched intensely. Several recent advancements in the genetic manipulation of monkey brains in the „Biopolis“ research centre in Singapore have caused speculations of the possibility of a genetic predisposition for obedience in the media. In addition, there were spectacular discoveries concerning the genetic basis of the submission instincts of dogs and wolves at the University of California last year.

Therefore, it is quite plausible that there are parties interested in any such research being conducted beyond this point. It is also plausible that such research would be conducted in secrecy, since the ethical implications are enormous and are obviously extremely negative. Strict international legislation that would ban this research however does, not exist.

According to our informant the name given to the research project leaves no doubt about the end goal of the research conducted: It is called „H.O.S.H“ which stands for Highy Obedient Sub Humans. Its declared goal is to create living beings that have the body and computing intelligence of human beings but no desire to pursue goals that were generated in their own minds. Such creatures would desperately seek direction and a relationship with a person to guide them through life. According to our informant, the project faces considerable challenges because it does not want to create lethargic creatures. The intention is to give life to bodies who have a lot of motivational drive, do not hesitate to suffer hardships and pains but are unable to make decisions on what to do and where to go without external help.

Madame, our task force has come to the conclusion that this development is extremely dangerous and extremely unethical. If this kind of research proves to be successful, the following scenarios could become possible:
• The first application could be that armies of HOSH creatures are formed. „Strong, highly dynamic, painless and obedient“ – this sounds very much like the description of the ideal soldier, which could also be the reason why the government of the Philippines has made its armed forces responsible for the project and not some civilian institution.

• Not only regular armies but just anybody might come into the possession of the new technologies once they have been developed. Suicide terrorism might find a new boost as soon as such creatures are available. This would particularly be possible when there is no externally visible difference between normal Homo sapiens and H.O.S.H creatures.

• We could also well imagine applications in the non-military field, for example, for doing dangerous work in mines, with explosives or in space travel. H.O.S.H creatures could be not only the ideal soldiers but also ideal workers.

• Other scenarios are more unlikely but theoretically possible: If H.O.S.H creatures are able to produce offspring with regular Homo sapiens, then it is theoretically possible that the lack of free will could be introduced (coincidentally or maybe even purposefully) into the normal population of mankind. This could have unforeseeable consequences for the development of democracies or for the ability of individuals to resist the marketing efforts of companies by making independent decisions. H.O.S.H genes would be the starting point for breeding more „governable“ citizens or more „receptive“ consumers.

I admit all this sounds very far fetched at this point and in fact, it is a development that should not be expected to materialize within the next few decades. After all, the first generation of clones that comes out of the research facility in the Philippines will have to grow at least to adolescence for observing the result of each trial run, so each research cycle will be at least 12 years. We estimate that it will take at least three research cycles to come to some results that might be usable for the defined goal of eliminating internal decision-making of Homo sapiens creatures and to succeed in creating H.O.S.H-creatures.

Nevertheless, our task force is very concerned about this development for the following reasons:
• Even though we already submitted a complete report about the case to our immediate superior, General Tom P., two months ago, on July 20th, he has continuously declined to issue orders on how we should proceed. Instead, he warned us repeatedly not to pass this information on to anybody. This is the reason why I decided to call you. I am acting on my own because I am very disturbed by the potential ethical implications of this case. I personally believe the world community should convince the Philippine government to give up this harmful and evil project.

• Our Philippine informant had a tourist visa that expired on September 10th, so ten days ago. After a phone call on September 8th in which we informed him that we still could not tell him what the position of the British government was, he disappeared and we have no information on his whereabouts. We also have no legal basis for finding and holding him. Please tell the Prime Minister he should advise us urgently on further action.

• Ever since a military government took over power in Philippines the relationship with the United States in particular and with all Western countries in general has deteriorated. Our relationship today is not hostile, but is not friendly, either. How should we handle the case given, this background?

• In one of the interviews, our informant said he had heard that in another department of the research facility where he used to work prior to his defection; there were two scientists from Nigeria. He did not know whether they were independent individuals who just had gotten regular employment there or whether there were official contacts to Nigeria on government level. Given the secrecy of the project, the latter seems more likely - should we check on this further?

I very much appreciate your openness and willingness to help.
Fiction Three: The End of Anger
(United Nations, 2060)

This is the transcript of a section of a fictitious speech that the Russian president Dimitri M. gave to the General Assembly of the United Nations in New York on September 20th, 2060. President Dimitri M. was well known for fascinating people with far reaching idea, but this one was by far the idea with the highest international impact.

The United Nations assembly was in turmoil after this speech. While some booed openly, others gave standing ovations. The following speakers did not mention anything in relation to the speech of the Russian president since they had all prepared speeches and also because they did not really know what to say. The speech caused a fierce public discussion all around the world with supporters and foes of the idea being approximately equal in numbers.

Two months after the speech, President Dimitri M. lost the election in Russia in a landslide defeat due to the poor results of his economic policy.

".....

Ladies and Gentlemen, let me address another concern and let me propose a solution for further discussion to you that all of us should consider after we have traveled back to our home countries.

We all know that the history of mankind has not always been a peaceful one. Wars and atrocities are an integral part of our history as much as we may despise that fact. Also, the meeting rooms of this United Nations building have seen very emotional meetings and some very angry discussions. Anger has led to violence and torture, fighting and killing for the past thousands of years and probably before that. Anger is destructive and anger is part of our nature whether we like it or not. The question is whether we really have to accept our own nature and be this way for all eternity.

We have become what we are today through many millions of years of evolution. I know that there are many people who do not follow this scientific view, but I do not believe that they represent the majority of the world today. The majority of the world population today believes in our having slowly emerged in an evolutionary process that has been going on for sev-
eral billions of years and has formed all the species on earth, not just us. We had no choice about our past development but we are absolutely allowed and not constrained by anybody to change our future by changing ourselves. Changing our own nature is not per se immoral, but instead depends on how we want to change it and why.

Anger and aggression are natural predispositions that we have inherited from our ancestors for whom those qualities might have been useful when trying to survive in the wilderness tens of thousands of years ago. Today we no longer need anger and aggression. We want to live in peace. We appreciate politeness, calmness and friendliness. Let us be honest – neither our laws, our unwritten moral rules nor our education during childhood and adolescence has so far succeeded in weeding out the powerful negative emotions created by our own biology. So what can we do?

My scientists in Russia are telling me that within the next few decades it might be possible to genetically change the structure of our human brain in such a way that anger no longer dominates our behavior and poisons our well-being. A lot has to be done for our researchers to reach the point where they can guarantee that their technology will work in any individual case exactly the way we want it to. But I am convinced that this is a goal worthwhile pursuing in a common effort of all of us.

I mean this very literally: All of us together, the world as a whole, should define anger and aggression as a disease that we all suffer from and that has to be treated in an intelligent way as would be expected from the civilized world society that we want to be. We all should participate and invest in the research efforts necessary. We all should share the fruit of these research endeavors to our mutual benefit. My researchers have told me that within the next three decades the technology for erasing anger from the brains of the generations to come could be an effective and safe procedure.

What I am suggesting to you can be summarized in only two points:

- We should initiate a joint $100 billion research project under the management of a new United Nations sub-organization that we could call the World Genetics Institute. The research program should have the goal to develop a sure and safe technology to eliminate anger as an emotion from all human brains by correcting the germline in appropriate ways. Russia is willing to give an amount of $5 billion over a period of ten years to help implement the proposed project.
• We should all enter into a binding agreement that obliges us all to pass laws in our respective countries that once this technology exists, its use shall be obligatory for all human beings to be born. Most parents will understand and follow the medical necessities with enthusiasm; only some might have to be forced for the good of the generations to come. All of the parents of the future should get all the necessary assistance so that we can all win the 'war against anger' just as we were and still are all together in the war against polio, HIV, malaria and other diseases that make life burdensome for mankind.

Ladies and Gentlemen, thank you very much for your attention. “
Fiction Four: Reproduction Decisions of the Rachandris (India, 2070)

On September 20th, 2070 a fictitious couple – Ramie and Tasha Rachandris - sits down to have dinner in a luxury apartment in Bangalore, India. They are well prepared for this evening, because after a nice meal they are going to make a decision about becoming parents.

From the sofa they had a magnificent view over sizzling downtown Bangalore where decades of economic boom had brought considerable wealth to its citizens. With both of them having well paid jobs in the city government of Bangalore, the Rachandris probably belonged to the top five percent of the wealth pyramid that was formed by the approximately 10 billion human beings that were alive on Earth in the year 2070. They were quite aware of their luck in life and enjoyed it. They had been together for almost 20 years and their marriage had seen good and bad times, but in the end they were happy to be together. Now they wanted to have a child.

Tasha was 40 years old and when she was 20, she had put 30 of her egg cells in a cell bank where they still were frozen safely until today. Ramie, also 40 years of age, had given sperm when they married some five years ago and placed it in the same cell bank. So theoretically they were free in their decision to either go for IVF (in vitro fertilization) or to produce their offspring the natural way by having sex and then waiting to see whether fertilization of an egg cell had happened. They had reached the common decision very quickly that the „natural“ way was much too risky and that it did not make any sense to purposefully not use all the advantages that modern medicine of the year 2070 had to offer. Indeed, amongst their friends they knew of nobody who would do so, and from their perspective the so-called natural way was an option that only extremely old fashioned or ideologically radical people would insist on. They also assumed, however, that the people in the slums still had children through uncontrolled sex.

Their decision-making had begun about a year ago, which had caused them a lot of psychological stress. It all began easily when they picked enhancement features from the catalogue of which they made sure that it only included genetic treatments that had been certified by the Indian Genetics Institute. India had always been one of the most advanced countries for biotech, but had experienced some major setbacks when faulty germline treat-
ments led to the deaths of hundreds of children at age five or six about ten years ago. This had been the reason for founding the Indian Genetics Institute.

Tasha and Ramie came quite quickly to a common decision concerning the gender of their child. For decades, all around the world, male embryos had had a greater chance of survival than female ones for all of those who had genetic screening and abortion at their disposal. In particular in India, with its culture of favoring male family members, the gender discrimination against female embryos had gone so far that there was a shortage of women in society now. As a consequence, in what some call a cultural revolution in India, daughters now tended to be more highly valued than sons. Daughters could hope to have on average 1.3 males competing for their love and companionship while of the males, only the upper 70% on the attractiveness-scale had a chance of finding a wife.

The Rachandris also had no difficulties coming to a common decision on the physical predispositions that they would wish for their child. There were certain enhancement -techniques available that increased the strength of the immune system, for example, that both Tasha and Ramie wanted to have for their future offspring. That was the most common genetic enhancement of parents chosen worldwide - and who could possibly argue against a better resistance against the attack of all kinds of harmful bacteria and viruses? They also decided that muscle enhancement was probably not worth the risk involved with the corresponding germline manipulation. Both of them were academics and agreed that they were not keen on having a super athlete as a child who might in turn suffer from all kinds of other genetic weaknesses that potentially came with this feature.

A more difficult topic for the intra-couple decision-making proved to be the question of what elements of brain enhancements they wanted. In the same way that many of the 20th century’s couples had to realize that it was not so easy to agree on the name of a common child, for the typical middle class couple of the late 21st century choosing genetic features for their offspring was a typical cause for lengthy discussions. For Ramie and Tasha Rachandri this was not any different:

While Ramie wanted their future child to be endowed with powerful information processing capabilities and with a memory booster, Tasha found this ridiculous given the fact that there were portable computers of the size of a
watch that contained more information and more computation power that one could ever wish for.

Tasha’s thoughts much more focused on enhancing the emotional well-being of their future child, but also there it turned out that both of them had two differing views when it came down to the details. While Ramie wanted to have the number of dopamine receptors increased in order to create a dynamic person, Tasha would have favored the boosting of the pensive and contemplative traits of their daughter-to-be.

Ramie had found out that there was a genetic booster available for the maturing process of the brain in early childhood. The effect of this genetic enhancement feature was that enhanced babies only needed some 8 weeks for the development of the brain that took over 20 months for regular babies. This was making it possible for the parents to teach language, explain things and in general not having to do with the low mental state of a „classic“ baby much earlier. Tasha was shocked. She was looking forward to taking care of a helpless baby as a loving mother, even though this meant more work for a longer time.

Last but not least, Ramie was opposed to the idea of Tasha letting the fertilized egg cell be implanted into her womb to let it mature. He had no understanding for Tasha’s need to be a „real mother.“ For him the uncertainties of the woman’s womb where just completely inferior to the controlled temperature, the constant and optimized food supply and the protection from external physical blows that a modern artificial womb offered. What he did not tell Tasha, but what was equally heavy on his mind: he found the idea repulsive that his wife's belly and vagina would be so grotesquely expanded by the maturing baby and then during birth.

The evening ended in a disagreement that was disturbing for both of them, leading them to decide to go through the genetic testing procedures first and then talk again. A few days later they went to the local office of the Indian Genetics Institute and signed up. As a first step they had to acquire a genetic profile of a few of their body cells to determine genetic weaknesses. Genetic diseases, for example, or predispositions for obesity, depression or heart attack.

This had already been a common procedure when Ramie was born in 2030 so he had already gone through a very similar check himself. Also, some of the major genetic weaknesses known back then had been eliminated by eliminating or activating certain genes in the DNA of the fertilized egg cell
of his parents and by inserting it into the womb of the mother. Ramie was created as an embryo in vitro, was already carrying a modified germline and was quite happy with it. Tasha's situation was different. Her mother had joined a Catholic sect in Calcutta in the mid 2030s and had met her husband there. They had four children together and none of them had been checked for genetic diseases even though most of the dangerous weaknesses had already been easy to eliminate in 2030. Such irresponsible behavior would no longer be tolerated by any society of the year 2070. The procedure that Ramie and Tasha went through was to a large extent required by law, while only some additional checks remained individual decisions.

The production of the genetic profile was generated directly by the owner of the DNA initiating the fully automated analysis. The procedure was quite simple: provide a cell of your body, insert it into the machine, and wait for the result. The result was only accessible by the owner of the cell who had, thus, full control over the use of the data, but he had to present a confirmation of having had the test done at the hospital where the child was born. Of course, that is only how it worked for the two-thirds of the population that had access to hospitals for giving birth in the India of 2070. The remaining third still had babies at home or on the street as they always had and no IVF or genetic testing, let alone enhancement, was part of what they thought about or could obtain.

The test of Tasha's body cells offered a blow to the couple: she had a major predisposition for a tumor of the brain stem at an older age. There was no doubt about it when she read the report about the results of her gene analysis. First, for a second, she thought about not telling Ramie anything about it, but she soon realized that this was impossible. How could she have gone ahead with the fertilization of her egg cell that was probably contaminated with the same destructive gene? And telling Ramie vaguely that she did not want a child any more was such an implausible lie that he would figure out immediately that the DNA check had caused her radical change of mind. Besides, she now wanted to know more about the risk of getting this terrible disease herself. She did not sleep well that night and when Ramie returned from a business trip the next day she told him immediately. He reacted very calmly and very lovingly.

They went to the doctor together and he looked at the results. He gave advice on how to accommodate their life style to the genetic weakness to decrease the likelihood of the tumor breaking out. He also gave comforting words about the low probability of this happening. He told the couple that
somatic gene therapy is possible, but still highly risky in this part of the body. Any little mistake could lead to tremendous damage so in essence he recommended doing nothing about it. After the shock had settled and the couple had gotten used to this unpredictable monster moving into their life, they nevertheless decided to go ahead and act on their desire to have a child. Upon their request, five of Tasha’s egg cells and some ten of Ramie’s sperm cells were removed from the freezer to be checked genetically with the same procedure. The owner of the cells initiates a machine that does the analysis and hands over a report to the owner of the cell without the involvement of any other person.

For almost fifty years now, genetic data of human individuals had been collected, stored and shared by almost all nations in a huge data base administered by the United Nations’ World Health Organization (WHO) in Geneva. Billions of variants of the approximately 30,000 human genes were stored there and compared with many millions of features that their respective owners had in their physical appearance, the structure of their organs, etc. A large and intelligent computer was busy day and night to find patterns of all kinds. The „International Genetic Data Collection Treaty“ foresaw that individuals were even legally obliged to provide their genetic data for the common good of the WHO data base, of course, in a guaranteed anonymous fashion. The results of the egg cell and sperm cell checks that the Rachandris initiated on that day in November of 2070 were also entered automatically into this data base since India had joined the treaty many years ago.

It came as no surprise to the Rachandris that Tasha’s egg cells also contained the same predisposition for a brain tumor that was found earlier in her body cells. Fortunately, altering the gene in the egg cell was no technical problem at all since it only consisted of 15 base elements. On that evening the Rachandris decided to continue their decision-making about the features of their future daughter.
PART (I) INTRODUCTION
1. THE GOALS AND THE STRUCTURE OF THIS BOOK

1.1. The Goals of this Book

1.1.1. My Concerns with the Quality of the Ethical Discussion about GEHB

Discussions on matters of genetics have become subject to a very heated ethical discussion, even though the application of modern genetics technology on humans does not even exist to a great extent at this point in time. Quite often unrelated matters are mixed together. Sometimes in discussions in the general public and in many media reports all the technologies for genetic modification and human reproduction are just thrown into one bag and treated as single entity for ethical judgments, even though this is definitely not the case. To discuss and categorize the technologies is not one of the major concerns of this book, but in a book about ethical judgments on a scientific development the description of this technology as part of the definition of the topic is a necessity that will be met in the following chapter 3, entitled „A Brief Technology Update.“

Heatedness in an ethical and political discussion quite often provokes radical views and gives room to spontaneous and ill-considered opinions. But the question of GEHB is far too important to make „quick and dirty“ decisions. There should be thorough consideration and that takes time and effort.

I am worried that the complexity of the issue is too confusing not only for the general public but also for many of the various decision-makers and „opinion leaders“ and that this will lead to outcomes that are not really intended and desired by the majority of humans. Of course I as an author might be driven by a few values and concerns that you as a reader might disagree with. But since I cannot simply switch off those values I might as well tell you what those values are so this is transparent and clear to you.
Tolerance: For one thing, I am not only open to a comprehensive analysis of all ethical aspects and arguments concerning GEHB (Genetic Enhancement of the Human Brain) I realize that this openness for all views implies a kind of liberal tolerance and thus a way of looking at the world that probably not everybody would be willing to share. A creationist in the American Midwest, a hard core technology enthusiast or a person with set beliefs about genetics might be shocked or offended by the openness to evaluate and take into account differing world views that those people might regard ridiculous, outrageous or dangerous.

Moderation and Differentiation: By nature, well considered views tend to be more moderate than spontaneous and impulsive ones. One can expect that after weighing a certain number of ethical arguments that come from quite different approaches and perspectives and after struggling with the inner logic of multifaceted ethical positions, it will be difficult for an intelligent individual to revert to one of them and completely reject the legitimacy of all the others. The most likely result will then be a differentiated view. This does not mean that the result will be a compromised opinion” in the middle between radical extremes. In fact, there most likely will still be strongly differing opinions. But the exchange of arguments will then have gained in quality and calmness.

Democracy and Informed Citizenship: The approach that I have chosen here also implicitly reveals my view of how political decision-making should work. I admit to believing in the benefits of democracy. However, I also consider these benefits to be dependent on the participants of democratic decision-making being well-informed and being open for considering various solutions to a given ethical problem. Not all democratic decision-making has always led to clever and well considered ends. There are numerous examples of democratic decisions that are quite shocking in an ethical sense. Therefore I believe that not only the level of democratic quality in the decision-making procedure but the level of topic related education of the participants is the key to good decision-making.

In brief, this book wants to make a contribution to an increased quality of the discussion about GEHB.
1.1.2. Problems of Neutrality and Completeness

I will try hard to achieve the goals of neutrality and completeness. But it would be overambitious, bordering on naiveté to assume that these quality criteria can always be fully reached when writing a book on ethical issues.

The problem can best be explained by likening the production of the intended results of this book to making a road map. When road maps are produced, tough decisions have to be made to reach the level of miniaturization and simplification necessary to show all the relevant features on a limited number of pages. If we go into a big city by car and want to find our destination in the street index, we want to see from the coloring of the indicated streets which ones are larger or smaller. Ideally we would like to see which streets are one way and for longer streets, it would be nice to know what the street numbers are. The perspective of a tourist walking through a foreign city center that he visits might be a completely different one – he will probably want to know where the historic buildings are that he has read about in his tour book and will need to find his hotel and tourist office on the map.

Of course, this is the Western way of looking at it. In impoverished suburbs of African cities this approach would be totally impossible because sometimes there are no street names at all. The roadmap would have to use other means of picturing the roads. The same is true in large parts of the cities of Japan, where only a few streets have names; addresses are mostly found by neighborhood names and block numbers. The same applies when making a road map of a country or part of a country. For a business traveler in the U.S., highways, hotels, fast-food restaurants and shopping malls are probably the most relevant road map information. For somebody on a holiday trip with a camper, things are completely different: Campgrounds and the highlights of the natural landscape are the most relevant pieces of information. On the contrary, when traveling in the Sahara desert or in Siberia the information of where water and gas stations are could be crucial. It does not need a lot of imagination to realize that maps that are produced for civic engineering must look completely different to those that are produced for fishermen or for airplane pilots. Of course the same thing applies to maps of the world as well. In an atlas, there are typically maps that show the political boundaries of countries, others the landscape and the rivers, the roads and cities, the population density or any other perspective of the same countries, etc.
Just as completeness is impossible in real maps it is equally impossible to produce a „road map” for ethical decision-making on GEHB issues. And just as real maps that try to be „as complete as possible” would provide a confusing, chaotic - and in the end useless - picture of reality, just like that also an overloading of the agenda for ethical decision-making would produce a useless tool from a certain point on. Too much completeness out of fear of not being neutral enough would not facilitate the discussion of the ethical aspects of GEHB but would make it more difficult to come to a conclusion.

The problem with simplification is, however, that the producer of a map or an agenda does determine the choices of the user of the map or the agenda to some extent whether he intends to do so or not. For example, if the producer of a map shows truthfully two roads leading from A to B, he can influence the decision of the user of the map to a certain degree by showing the wider of the two in big fat red and the smaller road in a thin yellow line. However, the producer of a map might change the likelihood that the map user will decide on the wider one by showing both roads in red and by marking the wider one as a toll road, or by putting in interesting landmarks right next to the thin yellow line of the smaller road in case of a tourist map. In other words: producing road maps is by nature not a neutral activity, since completeness is the exact opposite of the reduction of complexity that a good road map wants to achieve. There is always a built in trade-off between putting in enough information to allow the user to make a free choice and putting in so much information that it causes confusion instead of providing the clarity needed for intellectual advancement.

Of course the same is true for producing an agenda concerning the ethical decision-making on GEHB. To put the views and attitudes on complex matters like human emotions, technological risks, evolutionary theories or parental rights that exist amongst a world population of 6 billion people into a single agenda makes it necessary to leave certain items out and emphasize others. The categorization under certain headlines implicitly means a deviation from complete neutrality. The choice of words when describing certain ethical opinions might unintentionally reveal the opinion of the author. But without any comments and guidance from the author at all, the following text would be downgraded to an accountant’s listing that would not only be difficult to use but also be of shallow content.
I apologize if I have gone too far in deviating from neutrality or if I should have gone into a direction that seems improper to you as a reader. I can only assure you that I tried my very best to stay well balanced.

1.1.3. The Main Goal: To Develop a „Suggested Agenda” for Ethical Discussions about GEHB

An „agenda” as used here is a list of relevant topics that are presented in a logical order such that a systematic and well structured discussion can take place on its basis. Topics in the context of the agenda for an ethical discussion of GEHB can be either purely philosophical questions, or they can also be questions of technology assessment in a more scientific sense. So relevant topics can also mean knowledge input or scientific judgments from a scientist’s (e.g., a geneticist’s or a brain researcher’s) point of view.

This book will have achieved its goal if people can state the following after reading it:

- „I realize that technology forecasts on GEHB are uncertain judgments and that some of them underestimate while others overestimate the likelihood and speed of technological development;”
- „I understand the basics of the technology of GEHB. I understand that there are inherent risks and benefits concerning the human living condition. „
- „I know about some of the most important pros and cons from an ethical point of view and that helps me to put some basic order into the abundance of arguments concerning GEHB;”
- „There are ethical arguments to which I cannot agree at all but I understand their intrinsic logic;”
- „I have understood that genetic enhancement may be one technology but that it can be applied in many different ways. In particular, I have understood that there is a distinction between therapeutic applications and pure enhancement applications that is highly relevant in an ethical discussion. At the same time this distinction is very difficult to make in many concrete cases;”
I know that GEHB might become a problem of bio-politics in the future. I have some basic knowledge about different options of regulating it.”

Needless to say, this does not necessarily mean that those people using this agenda for making an ethical decision will come to the same conclusions on the content issue of ethical judgments on GEHB. But that is not the point, either.

Just like using a road map for a car ride by no means determines where you go and how you get there; the Suggested Agenda for an ethical discussion on GEHB will not be able and does not want to replace ethical decision-making. Rather than that, its purpose is to facilitate this process by showing which possible roads there are and what features they have.

Seen this way, the purpose of the Suggested Agenda that will be developed in the rest of this book is to be:

- A decision-making tool;
- Something that single individuals and groups can use as a guideline if they want to make sure that none of the most relevant issues will be forgotten;
- Something that can be followed systematically that will provide a fair chance to include all major issues;
- Something that cannot and does not want to provide the ethical decision itself but that facilitates and structures the decision-making process.

Such a tool in its basic form would be helpful, in particular for the following people:

- For ethicists:
  - To improve the quality of the philosophical discussion on GEHB;
  - To promote this discussion by making its relevance clear
  - To facilitate the creation of their ethical position.
- For policy makers:
  - To guide the segment of society that they are responsible for through a difficult decision-making process;
To lead towards sound policy making on the issue of GEHB by political institutions;

To recognize the patterns of arguments that will almost inevitably come up.

For informed citizens:

To assist them in their struggle to come to their own, well founded ethical position;

To obtain an overview of the most important ethical arguments and how they are interlinked.

For scientists in the field of modern biology:

To consider the ethical dimension of their profession, especially for those who are concerned about the applications of the results of their research work.

For prospective parents:

To assist them in their difficult struggle to determine what is best for their future children

To assist them in their struggle to find out what kind of life and family they themselves want to have together with their children.

To come up with a complete, sophisticated and well structured agenda for ethical decision-making on GEHB - the defined goal of this book - the first step has to be an analysis of the spectrum of opinions that have been published so far. Only an analysis of the emotions, the judgments and the reasoning in relation to GEHB that are out there today will lead to knowledge about the most relevant questions to be asked tomorrow.

In case of the ethical arguments concerning GEHB this is a very difficult task at this point. GEHB as a topic of ethical discussion is by far too new, too exotic and perceived as too futuristic to have attracted a sufficient number of serious intellectuals. As a consequence, the research of this book would come to an end very quickly if only ethical statements were taken into account that focus explicitly and exclusively on GEHB.

This lack of specific material leads to the necessity to also regard ethical statements on neighboring or related issues as relevant for developing a useful agenda. Admittedly, this entails the risk of making wrong interpretations and assumptions and thereby of coming to wrong conclusions. For ex-
ample, it is somewhat likely that somebody who distrusts technology in general and is also specifically against genetically manipulated agricultural plants because of his/her general mistrust in technology will also be against GEHB. It is likely but it is not assured – maybe this person perceives the potential benefits of GEHB as being worth the risks while he thinks that transgenic food does not justify them. Or: the assumption that somebody who fiercely opposes cloning for religious reasons will also oppose GEHB is legitimate, but in the end it is just an assumption. Not making such assumptions, though, would turn the agenda into a very „watery soup“ and is, thus, not really a viable approach.

In particular, focusing exclusively on the genetic enhancement of the human brain and to not include the whole discussion on genetic enhancement in general would be virtually impossible. Those two issues are by far too much interwoven from an ethical point of view. Focusing on the human brain exclusively would be acting like an architect who wants to design the roof terrace of a high rise building while ignoring the whole structure of the rest of the building. It would be impossible.

Another difficult decision to be made for the design of the agenda is concerning the width of the scope of views. If completeness in listing all the relevant ethical positions concerning GEHB is the goal, does that mean that even the most exotic, strange or repulsive views must be taken into account? Do, for example, all the fundamentalist religious doctrines and all the theories involving aliens from outer space really have to be included as well? Do we have to accept brutally racist, extreme sexist and other radical views on the list of possible ethical positions in order to stay unbiased? With completeness of the collection being one of the major goals it is very difficult to make decisions to exclude any of those ethical positions just because they seem too outrageous or because it is the position of a very small minority. I can only hope that you as a reader will find the choice acceptable that I as an author made.
1.2. **What is an Ethical Position?**

1.2.1. **The Problem of Definition**

The questions „what is a moral position?“ and „what counts as morality?“ or „what is ethics?“ have occupied philosophers and other great minds for millennia. Many pages and books have been written about the definition of these terms. This, on the other hand, is a scientific work about ethical positions concerning a certain issue (i.e., GEHB). Thus, the problem of a definition of „ethical position“ is not the focus of this book but still has to be tackled in a satisfactory way without slipping too much into the sophistication of this specific field of philosophical discussion.

To reach a compromise between being precise and being generally acceptable on the one hand, and the need to keep it simple and not lose sight of the main issue of this book on the other hand, I decided to derive my definition of „ethical position“ from three sources, even though neither of them explicitly uses the term „ethical position“:

- Ronald Dworkin’s Article „The Concept of a Moral Position“ (Reprinted in Beauchamp – Philosophical Ethics, 2001)
- Beauchamp & Childress’ „Principles of Biomedical Ethics“, Part I (2001)

To begin with, all three sources agree that there is a difference between „ethics“ and „morality“:

„In its most familiar sense, **morality** refers to norms about right and wrong of human conduct that are so widely shared that they form a stable (although usually incomplete) social consensus.‟

„**Ethics** is a generic term for various ways of understanding and examining the moral life. Some approaches to ethics are normative, others are non-normative.‟

(Both quotes from Beauchamp & Childress, 2001, pp. 1 and 2)

An ethical position is, thus, an analytical piece of work on a moral concept or a moral issue that is done from a certain perspective. A position is, in its original sense, a location in space that is a matter of choice. Any position
taken could be a different one, too, and Beauchamp & Childress’ remark about the „usually incomplete social consensus“ concerning moral positions implies that the producer of an ethical position cannot do his job from „the“ right position, but that there are many options to take a viewpoint. Thus, there is no complete neutrality possible. This statement confirms what was said above about my own position as the author of this book.

Ronald Dworkin argues, though, that this does not mean that all judgments automatically count as moral or ethical, but that certain criteria have to be fulfilled to distinguish a moral position from an emotional impulse, prejudice or general belief. In particular, the following conditions have to be fulfilled:

- Moral positions must have a reasoning that is derived from a set of inter-linked principles or a system of values
- „... The moral position is supposed to justify the emotional reaction and not vice versa. “
- The facts on which the moral reasoning is based must be correct or at least sufficiently plausible.

Apart from these formal criteria, there are also content criteria, but they are obviously very difficult to grasp in a definition that is supposed to be universally valid. For example, it is common sense knowledge that it is immoral to kill other human beings. But at the same time we all know that there are numerous exceptions where this general rule is not applied and that it is exactly there where different cultures disagree fiercely (e.g., the death penalty, abortion, killing in war, killing in defense, assisting suicide, etc.).

In search of minimum standards for the contents of morality, Michael Shermer’s approach of trying to find a common human basis by means of scientific anthropology on the one hand and by studying human beings as an object of biological research on the other hand seems to be a very promising one. For example, humans all can express and understand affection, they all have feelings concerning the status of people that are older or younger, all humans plan and anticipate the future, all humans strive for material property, etc. Shermer’s claim is that it is the ability to feel compassion that makes humans „moral animals“ and this has far reaching consequences for the contents of any ethical considerations.
There is a fine line – one could also say a „membrane“ – between the definition of a moral and an ethical position, since the difference between those two is determined by the degree of rationality and analytical power that leads to it. I will not elaborate on this issue any further, and hope that the experts in this field will forgive me for that.

1.2.2. Elements of an Ethical Position

There are a few conclusions from this approach that are relevant in the search of ethical positions. For example, the position of an ethicist cannot be chosen completely arbitrarily, there are „natural“ limits to that if the intention is to stay inside the realm of what is ethical. Also, ethical positions always relate to rules governing the life of humans in a community, mostly these are binding rules. An ethicist must dig deeper into the psyche of those people whose moral position he tries to analyze if he wants to do a thorough job even though he knows that an emotion-free, purely logical approach to ethical analysis is impossible. And there is more to be discovered than just the verbal ethical judgment and the reasoning behind it, there is usually a wealth of underlying emotions, beliefs, attitudes and values that the owner of a moral judgment may not even be aware of. In other words, besides the rational system, there is an „underground system“ to be discovered as the following graphic shows (see next page):
This graphic also makes clear that moral and ethical positions are seen here in this book not at all as „floating above the real life world,” detached like a spaceship from planet earth. Instead, morality and its sources, the underground system and the rational system that each human being carries in itself as an individual are seen here as an implicit given of any kind of decision-making. Human beings are certainly able to commit immoral acts – individually or collectively – but that does not deprive most of them of the natural need and natural capability of making ethical judgments.

To sum up, the ethical positions on GEHB that are taken into account in this book all fulfill at least two criteria:

- They are ethical in a sense that there is more or less elaborate argumentation attached to the pure moral statements;
They are positions that argue in favor of what is perceived as some kind of common good of a larger community.

1.2.3. Who shall be the Target of Ethical Behavior?

Of course the definition of what „community“ means for ethical considerations can vary widely, so one has to be more specific in this respect.

The ethical positions studied in the following chapters all have in common that they take the well-being of not just one individual and his immediate social environment into account but instead the well-being of many people.

Ethical positions that regard the immediate community or the (extended) family as the sole relevant object of morality were common concepts in pre-historic times. We can assume that in certain cultures or subcultures this is still the case today, for example in the Mafia, in the daily reality of those many millions of humans who live in extreme poverty, or in some religious sects. These ethical concepts do exist in our present reality and there may be arguments to justify them as well.

But this book assumes that there are no sufficient arguments to declare those moral concepts qualified enough for coping with an ethical problem as large and as universally human as GEHB. Therefore a higher level of „community“ seems a more appropriate starting point of the investigation of ethical positions concerning GEHB. This book assumes that ethical positions must at least take into account the well-being of societies as they are defined by 21st century nation-states in order to count as such.

It has to be noted, though, that this definition does not exclude those ethical positions that argue that the ethical decision-making about GEHB should rest with the parents, i.e., with the family, since this position could be and will most likely be a position concerning society. The view that the „decision-making within the family has priority because the family is the nucleus of any healthy society“ can be disputed and discussed. But this view has nothing to do with the morality that mafia clans have and that they probably share with Stone Age families, i.e., that humans outside the clan are creatures that do not deserve even a minimum of solidarity (see further explanations in chapter 7 below).
Likewise, it would be too extreme as well to only accept those positions as being ethical that include humanity as a whole, or even the whole biosphere, meaning animals, plants, natural systems like the climate, etc., as an appropriate object of moral concern. Besides, the attempt of this book to create a collection of ethical positions as complete as possible would come to a halt very quickly under these constraints since those ethicists who actively promote the view that policies on GEHB are and have to be species-related policies (and wrote about it) are not numerous at all.

I admit that the choices made on which ethical positions are to be taken into account and which ones are left aside is a somewhat arbitrary selection for which I apologize. But for pragmatic reasons I would like to just leave it at that without further ado and move on.

1.3. Publications on Genetic Enhancement in General and GEHB in Particular

One of the obvious starting points of a research project that intends to create an overview of the most important ethical positions on GEHB is a thorough analysis of the relevant publications. While this decision is easy in principle, the more difficult part is to define what is „relevant.” As GEHB technologies do not yet exist, there is a lot of speculation going on and the researcher faces the decision to either include a piece of published speculation in the overview or not.

In particular the decision has to be made whether speculation formulated in the form of fiction writing should be included or not. As you can deduce from the pieces of fiction contained in the prologue of this book, I am of the opinion that fiction writing absolutely does have a justified place in this specific case. Fiction writing is not only a good way of describing the details that create the more emotional aspects of coming to an ethical decision, it is also very helpful in describing future scenarios where empirical evidence from past or present events or conditions is not available. The problem with fiction is, however, that even though there is a lot of intelligent fiction writing available, there is also a lot of garbage. This seems to particularly be the case for science fiction.
I will, therefore, start by giving a brief overview of what kind of intelligent fiction writing I believe to be influential for the creation of ethical positions on GEHB before going on to describing the scope of non-fiction literature that is available on the subject.

1.3.1. Setting the Stage: Radical Visions of GEHB in Fiction and Movies

When Aldous Huxley published his novel *Brave New World* in 1932, the world was already observing an ongoing radically communitarian experiment in communist Russia. This was based on a paradigm that can be described this way: human beings can be formed to a great extent when one is only willing to overcome the old, self-inflicted, pseudo-ethical limitations of the capitalist power system.\(^1\) Another radically communitarian experiment was just about to begin in Germany. In January of 1933 Adolf Hitler came to power. With him came the Nazi ideology that assumed that there is a biological determination that automatically categorizes human beings into members of the master race or members of inferior races. The task of politics according to this ideology was to improve human existence by expanding the genetic reach of the master race at the expense of the inferior gene pool of the other races.

Whether Aldous Huxley actually assumed GEHB or any form of genetic enhancement to be the technological basis for the operation of the breeding factories that have replaced old-style families in the „year 600 after Ford” is unclear. Genetic technology was not an issue in 1932 since DNA had not yet been discovered. It is much more likely that Huxley imagined a breeding technology was based on the deliberate management of the selection-reproduction cycles that were the core research objects of Mendel as well as Darwin. But for the first time ever, this radical fiction masterpiece hatched the idea of replacing natural randomness by technological interventions to assure that humans grow up to fit into society. Plus, it transformed the idea of what a good life should be the basic idea behind GEHB had already been born before that with the eugenics policies in North America and Europe in the early 20\(^{th}\) century. This kicked off a wide ranging philosophical discussion that has been raging ever since.
After WWII mankind had other problems besides speculating about the distant possibility of GEHB. Even though in 1953 the double helix-shaped DNA was discovered by James Watson and Francis Crick, the fiction written at the time was more concerned with the Cold War and the social and mental changes happening in the West during the 1960s and 1970s. In the 1970s and 1980s the focus of intellectual discussions had indeed a lot to do with biological science but in a way that was very remote from studying the biology of the human being: the main issue was the effects of human technology on the natural environment. Besides, the determination of the human being by biological invariables was an unpopular point of view after the atrocities of the Nazis had helped popularize paradigms like biological equality and the idea of the human brain being a „blank slate“ at the time of birth. The most common and politically correct popular belief of the 1970s and 1980s was that humans could be formed by education to an almost unlimited extent.

It is little wonder that in this context it was not until the 1980s that genetic engineering applied to humans became a topic of fiction again. A true classic in this phase of modern genetic enhancement scenarios is the movie „Blade Runner.“ In this 1984 movie the protagonist hunts a criminal genetic engineer who has created a number of artificial human creatures („replicants“) who are hunting him. The movie is set in a world that has to suffer not only from the results of a changed climate – it rains almost constantly during the whole movie – but also from the effects of a completely uncontrolled free market for products and services in the realm of genetic engineering. The enhanced humans are all spooky creatures who live in an undesirable environment without hope that this development is reversible in any way. Even though „Blade Runner“ is a science fiction thriller produced for entertainment, the background theme makes a statement that is very much a political one.

This is not really true for the X-Men movies that first came out in the 1950s and then experienced a more high-tech remake in the first years of the 21st century. These movies are mainly based on action and suspense and only contain a very simple but interesting political message: the mutants (x-men) are subdivided into two groups: the „bad guys“ who want to suppress the inferior non-mutant population of the planet Earth, and the good guys who are also mutants but care and defend the inferior non-mutants. Genetic enhancement does not have to exclude empathy and moral conduct -this is the implicit message. We will come back to this aspect in later chapters.
The 1990s saw a sudden upswing of science fiction literature focusing on biotechnology as a critical issue. One can only speculate about the reasons here. Was it the end of the Cold War that freed the mind of the world’s intellectuals for other issues? Was it the well publicized Human Genome Project and its speedy completion that made the intellectuals realize how fast things are developing in this field? Was it the outrage about the cloning discussion after the clone sheep Dolly was born in 1997 that led to this shift in focus?

It could also be that the dynamics of the fiction production world created the new focus from within itself. In 1993 the genius filmmaker Steven Spielberg turned a novel by Michael Crichton into one of the greatest box office successes in the history of movie making: In „Jurassic Park”, DNA of dinosaurs is extracted from amber and used to replicate the real live creatures in a test tube. The 1997 sequel still brought in almost US$ 230 million due to the intelligent mix of traditional suspense and human touch, stunning quality of computer animation, and an exciting technology forecast that seemed at least semi-plausible.

Steven Spielberg also produced another box office hit by turning to the topic of „A.I. - Artificial Intelligence”. In his 2001 movie with this simple title a world is portrayed that uses machines to fulfill not only services but also emotional needs. A little robot boy that was bought by humans to substitute the child that they could not get malfunctions and is therefore expelled from his home, whereupon he is subjected to all kinds of maltreatment. The problem when watching this movie is that one cannot help but feel compassion and pity for this little human-like machine. This causes a very unpleasant inner conflict about whether a robot is a „proper” object for such emotions. The 2003 movie „I robot” (based on a novel by sci-fi master Isaac Asimov from the 1950s) also turned its attention to the question of whether brains are just super complex machines and whether machines can become objects of morality and deserve our empathy as soon as they develop emotions themselves. The underlying assumption in all of these pieces of fiction is always that all of the elements of our emotions, thoughts, desires, etc. are nothing but a function of highly complex brain structures that can ultimately be copied artificially. This very assumption is the basis for all GEHB as well, since GEHB would not be possible if there were other, non-physical factors determining the feeling and the behavior of a human individual. Early versions of this theme can be found already in the 1987 action thriller „RoboCop” of in which the main figure is a man-machine hybrid.
The topic of man-machine interfaces is viewed in a completely different way in „Matrix,” a cult movie trilogy, with the first one released in 1999. Here is the plot: „Computer hacker Thomas Anderson has lived a relatively ordinary life, in what he thinks is the year 1999, until he is contacted by the enigmatic Morpheus who leads him into the real world. In reality, it is 200 years later, and the world has been laid waste and taken over by advanced artificial intelligence machines. The computers have created a false version of 20th-century life -the „Matrix” -to keep the human slaves satisfied, while the AI machines draw power from the humans.”

(Source: http://www.imdb.com/title/tt0133093/plotsummary copied in July 2006) In „Matrix” as well as in the „ Terminator” series with Arnold Schwarzenegger the theme is that machines have taken over power and the man-machine hybrids are acting as agents against the remaining humans. The latter can only win with specifically human intelligence. The plot only hints at what that exactly means.

In all of these movies the interesting elements of the story, the suspense and the catharsis is based on the fact that something goes wrong because the technology does not function the way it was intended to function by its inventors. Those who are applying the technology are mostly linked to a powerful corporation that they own or manage or they are part of the military complex and they are always the „bad guys.”

This is also the case in the movie „The 6th Day” starring Arnold Schwarzenegger. The movie portrays a world in which cloning animals,– including pets, has become a quite normal service that can be bought in every shopping mall. The cloning of human beings remains strictly prohibited but is done anyway by the anti-hero of the movie. The movie was released in December 2000 after the decoding of the Human Genome Project had been declared to be completed in June 2000, catapulting cloning to a central topic in the media. Interestingly, the producers of „The 6th Day” made a great effort to offer a technologically realistic story including when it came to the „filling of the brain.” Schwarzenegger’s main opponent, the anti-hero, does this by copying his brain content into cloned copies of his own body thereby gaining eternal life.

The fact that genes only partly determine the individual personality of clones is made a topic in a very intelligent way in Ken Follett’s novel „The Third Twin” from 1996 (also made into a film in 1997). In it, the protagonist finds out in the end that he is one of several clones. These clones share cer-
tain traits, but one of their shared traits has turned one of them into a murderer, another into an artist, etc. Ken Follett comments on his book on his website http://www.ken-follett.com/bibliography/thirdtwin.html July 2006:

"Everyone is interested in twins. There are lots of twins in literature: Shakespeare, for example, used them. The idea that there is someone who looks exactly like you is very intriguing and dramatic. Clones are just like twins. Everyone is worried about cloning and something that makes people anxious is the ideal background subject for a thriller. Steve, the hero of "The Third Twin," is troubled when he finds he has an identical twin who is a murderer. He's led to examine himself and he worries that he is like his brother. He asks, 'Do my genes make me what I am? Or is it my upbringing and my environment?' He comes to the conclusion that, in the end, he himself is responsible for what he is. That isn't really a philosophical answer, but it is a personal answer, and it is one that I believe in. I don't think that after about the age of 25 you can carry on blaming either your parents or your DNA for anything that you do. My readers don't buy my books to learn about philosophy, of course, but they like a story to have a thoughtful side."

The feelings of a clone are analyzed in a very thoughtful way in the movie "Blueprint" from 2003 in which Franka Potente plays the daughter of a famous pianist who has her produced as a clone in order to preserve her own talents. Cloning, this is the message of this movie, is not caused by concerns about the best interest of the child but by self-love of the parent whose cold-bloodedness is emphasized by the fact that there is no place for a father. But Franka Potente as the clone develops mental freedom and in her search for liberty and autonomy she breaks free with catastrophic consequences for the human relations between all the persons connected to the cloning act.

A real classic in the area of genetic enhancement is the movie "Gattaca" from 1997. The name "Gattaca" is composed of the letters used to label the four nucleotide bases of DNA guanine, adenine, thymine, and cytosine. At first sight "Gattaca" is just another suspense movie in good old Hollywood style:

"(The protagonist) Vincent is one of the last "natural" babies born into a sterile, genetically-enhanced world, where life expectancy and disease likelihood are ascertained at birth. Myopic and due to die at 30, he has no chance of a career in a society that now discriminates against your genes, instead of your gender, race or religion. Going underground, he assumes the
identity of Jerome, crippled in an accident, and achieves prominence in the Gattaca Corporation, where he is selected for his lifelong desire: a manned mission to Saturn. Constantly passing gene tests by diligently using samples of Jerome's hair, skin, blood and urine, his now-perfect world is thrown into increasing desperation, his dream within reach, when the mission director is killed - and he carelessly loses an eyelash at the scene! Certain that they know the murderer’s ID, but unable to track down the former Vincent, the police start to close in with extra searches and new gene tests. With the once-in-a-lifetime launch only days away, Vincent must avoid arousing suspicion, while passing the tests, evading the police, and not knowing whom he can trust…”


But „Gattaca“ is more than just suspense and a winning of the good over evil in the end. „Gattaca“ is an impressive document of doubt of the superiority of genetic enhancement. It starts with natural Vincent winning in a lethal swimming competition over his genetically enhanced brother and ends with Vincent freeing himself from the genetic discrimination that is the predominant feature of the future fictitious world that he lives in. „Gattaca“ is also a depressing document of pessimism regarding technology where the blame for the negative effects of genetic enhancement is not simply stuck on an evil anti-hero but where everybody contributes to the situation. Nobody is really the single evildoer. Interestingly and shockingly, not all the viewers of „Gattaca“ obviously understood the message of the movie to be so negative: According to the website http://www.imdb.com/title/tt0119177/trivia of July 2006 „...When Gattaca was first released, as part of a marketing campaign there were adverts for people to call up and have their children genetically engineered. Thousands of people called, wanting to have their offspring genetically engineered”!

While a focus on major movies increases the likelihood of readers having seen the object of reference, at the same time it makes it obvious that the list provided above cannot be more than but a glimpse into the wealth of not so well known science fiction productions that is out there.

One last pieces of literature I would like to mention is the 1993 novel Mutation by bestselling author Michael Cordy. This one did not make it to the movie stage, maybe because of its lack of political correctness. The story is set in 2008 and emphasizes the well-meaning intentions of the anti-hero
more than other novels dealing with modern biotech: the FBI director of Michael Cordy’s novel is a woman who has been abused by her father and has suffered other deep disappointments with men. She is determined to erase all crime and as the story unravels it becomes clearer that she intends to do so by wiping out the male half of the human species with a genetic mutation device. The semi-scientific explanation of this unusual act of radical feminism is that males are the cause of nearly all crimes committed, in particular young males who commit violent crimes. Of course at the end of the story, the destruction of all male humans can be prevented in the last minute. However, the author of Mutation does not offer the readers any explanation of why we should be happy about this turns of events after all the highly plausible explanations about why it would make sense to have human societies consisting of female personalities only. The impulsive reflex to preserve the human species the way it is now meets the wildest transhumanist-style aspirations of species-altering in this novel without, it seems, the author being aware of the complicated field of philosophical discussion he had entered there.

1.3.2. GEHB in Modern Popular Science Literature

In the late 1990s and in the first few years of the 21st century, a number of non-fiction publications dealt with the question of genetic enhancement of human beings. Here again we can assume that the Human Genome Project and its well publicized end in June of 2000 triggered this sudden emergence of several pieces of mostly popular science literature.

But then again, there has always been a small but dedicated group of science-believers who have had no doubts about the future of genetic enhancement. There have always been publications for this target group. Early non-fiction publications on human enhancement where mostly influenced by the forecasts of Hans Moravec and Ray Kurzweil who claimed that the main driving factor for human enhancement will not be biotechnology but the advancements of computer technology. They see computers becoming smaller and smaller and more and more „intelligent“ up to the point where computer intelligence and human intelligence merge by computers becoming „persons“ and biological humans becoming man-machine mixtures with electronic computer elements implanted. One of the applications could be, for example, „brain extension,“ meaning the use of technical devices in or-
der to support the normal activity of our brain. Those visions are far reaching and include links of the brain with the Internet and, eventually, also with other brains.

The starting point of these thoughts is the rapid development of computer technology. Indeed, computers are memory and intelligence extensions, or to be more exact, information processing extensions by their very definition, just as by definition bicycles and cars are speed extensions, telephones are communication extensions, eye glasses are sensory extensions and so forth. Gregory Stock calls the human being equipped with these ever smaller and ever more portable devices „fyborg“ (which is a variant of the idea of a „cyborg“) and the reality of the early 21st century is that virtually all human beings in industrialized societies are already „fyborgs“ to some extent.

Some authors like Kurzweil (The Age of spiritual Machines) and Hans Moravec even see the risk that super-intelligent machines will outdo regular humans in their physical and mental capabilities. Once they have developed their own desires and have learned how to reproduce without depending on human-made software, they take over the planet as the new superior species. Artificial intelligence, the proponents of this theory say, will spearhead the development. If you have seen the movie „The Matrix“, in which humans are kept in a constant dream by intelligent machines to generate electricity for the machines with their human bodies, then you will get some idea of how far those visions can go. Indeed, the Terminator movies are in the end based on the ideas of Moravec and Kurzweil. According to these authors, humans have only one possibility to prepare for this and that is the massive enhancement of their own physical and mental capabilities. To stay on top and avoid being surpassed by machines we must boost our capabilities by integrating ultra-high-tech enhancements into our bodies and brains, they claim.

The enhancements of the human brain by means of computer technology are by definition not the topic of this book, since this is a book on genetic enhancement. I will, therefore, ignore these theories from this point on, even though many well educated people believe that the use of artificial intelligence and our „merging“ with high-tech enhancement has the chance of becoming reality much more quickly than genetic enhancement with all its image problems. I tend to agree with Gregory Stock, though, who voices serious doubts that inserting a powerful chip into the densely packed neuronal network of our brain will be easier to achieve than enhancement by germline technology. And besides, silicone chips might be ideal for increas-
ing our cognitive powers, but they would leave our emotions untouched. I don’t think that is what people will strive for most in the long run.

Another topic in literature about high tech visions involving the human brain should also be mentioned here for matter of completeness, but which I will hereinafter leave untouched namely technologies for the „decoding“ of the brain and their ethical implications. What does this mean? Modern brain research shows us that contents are stored in the brain in the form of chemicals and electrical charges, very much like information is stored in computers. However, the computers that we have today are all still based on silicone chips and cannot store any chemicals, just magnetic charges. As we increasingly understand the way memory is built and retrieved in our brain, two technological possibilities might arise one day:

**Uploading.** We might be able to decode the memory stored in our brain by introducing electrodes or some other, more sophisticated communication lines into our brain, recreating the image that somebody retrieves from his memory, for example, on a computer screen. This may sound very far-fetched today but recent advancements of brain-related technologies include the possibility of creating an interface with the brain of paraplegics to a computer such that they can move the cursor with their thoughts. So the first step to uploading might have been already made, and may someday lead to extracting brain contents in order to store them on an external storage device.

**Downloading.** Once it is actually understood how information is retrieved artificially from a person’s brain, then the next step could be tackled: one could try to input information into human brains artificially. An ancient dream of filling knowledge into the brain without having to go through the painful process of learning could be fulfilled. This technology would go beyond what genetic enhancement of the brain could achieve. Foreign languages, for example, the knowledge of an architect or the skills of a musician are not part of genetic heritage and the simple downloading from other forms of storage, e.g., in a data base, could become the fast-forward method for learning.

Once again, the focus of this book will remain on genetic engineering rather than electronic implants and the use of electronics to enhance the human brain in any form.

An important source of visions of enhancements of all kinds is the „World Transhumanist Association,” founded by Oxford philosopher Nick Bostrom
in 1997. The website of this association explains: „The World Transhumanist Association is an international nonprofit membership organization which advocates the ethical use of technology to expand human capacities. We support the development of and access to new technologies that enable everyone to enjoy better minds, better bodies and better lives. In other words, we want people to be better than well.“

(from: www.transhumanism.org/index.php/WTA/index/ July 2006)

Most of the articles posted on this website and most of the books recommended there are publications on genetic enhancement.

But there are also a number of books that were specifically written to deal with the issue of genetic enhancement in a serious, all-encompassing and non-fiction way by authors with a wide range of different attitudes and opinions. The following bestsellers will be amongst the most important references concerning non-fiction visions of genetic enhancement for this book because those are the most prominent publications in a heated public debate that took place above all in the United States during the years 2000-2005. Those books offer not only technology forecasts and not only philosophical thoughts but a combination of both:

- Glenn McGee: *The Perfect Baby*. (2000). This is the first of the classic non-fiction books written by an academic of the University of Pennsylvania’s center for Bioethics on the topic of making ethical choices around genetic enhancement. The first edition was published in 1997.

- Gregory Stock: *Redesigning Humans* (2002). Stock is known as one of the proponents of human genetic enhancement and organized a famous conference on this issue in 1998.

- Francis Fukuyama: *Our Posthuman Future* (2002). Fukuyama is part of the conservative establishment (for example, he used to be a member of the Bioethics Council of President George W. Bush) and as such is critical of genetic enhancement. He offers in this book a comprehensive wealth of arguments for his position.

- James Watson: *DNA* (2003). James Watson, one of the discoverers of DNA, published this book to commemorate the 50 year anniversary of the discovery of the double helix structure in 1953. In this book he expresses a favorable attitude towards genetic enhancement, well known from previous publications.
• Bill McKibben: *Enough – Staying Human in an Engineered Age* (2003). McKibben has become known for books on ecological issues and offers a wide range of „leftist“ arguments on why one should beware of human genetic enhancement – if there really is such a thing as leftist bioethics at all.

• Joël Garreau: *Radical Evolution* (2004). Garreau is not a scientist but a journalist. He tries to form a summary of scientists’ writings and come up with conclusions about the issue of human genetic enhancement. The fact that he points out that there might be several different scenarios and not one right or wrong way to go makes his book interesting.

• Hughes James: *Citizen Cyborg* (2004). James Hughes calls himself a „de-mocratic transhumanist.“ and is the secretary general of the World Transhumanist Organization. This book could be seen as a compendium of the arguments of moderate transhumanism.

• Ramez Naam: *More Than Human - Embracing the Promise of Biological Enhancement* (2005). This book by a prominent software engineer (Naam was involved in the development of Microsoft Internet Explorer and Microsoft Outlook) gives insight into the thinking of a flaming proponent of the possibilities of human genetic enhancement and is interesting in its complete bias in favor of technology.

Basically, all of these publications suggest that genetic enhancement will be possible as a technology at some point in the future and that we will have to cope with it somehow. Genetic enhancement and humanists impact on the human race is a hotly disputed topic. Thus none of the publications above or any of the numerous articles and other books listed in the bibliography is completely neutral in a sense that only facts are reported. None of these publications focuses on GEHB exclusively; instead, they all assume that genetic technologies will become available for enhancing both the body and mind of human beings.

Most common body enhancement possibilities that are discussed include:

• Longevity (or even immortality?)

• Better looks

• Better immune system, better health

• Better bones and joints

• More muscular strength
• More physical endurance
• More tolerance to heat, cold, toxic substances, etc.
• Better senses
• Superhuman senses, like night vision and sonar hearing
• Etc.

In particular, the issue of extending life spans, better health, staying younger longer and eventually striving for immortality has been the topic of choice for numerous books, articles, and conferences in the recent past. There is also a lot of discussion about the genetic enhancement of athletes. More red blood cells, for example, would mean increased endurance in long distance sports, more muscle would mean increased strength, etc. Since there is a general strong disapproval of the doping of athletes, the topic of how genetically engineered athletes should be regarded is a much used topic to illustrate the ethical problems of genetic enhancement.

To a lesser extent, the potential military or political abuse of genetic enhancements is made an issue in most of those books. Examples include the creation of not only more athletic, more fearless and ruthless soldiers, but also humans with increased sensory power and endurance for a military purpose. Joël Garreau touches on this subject more extensively. Since it is above all the United States where this current public discussion is taking place, the basic assumption is primarily that it is not the government or its institutions who are the main players in a future genetic enhancement market, but mainly the autonomously acting parents. Thus, a lot of speculation also goes into figuring out what preferences the parents might have in their future demands of genetic enhancement. Gattaca’s scenario where it is normal that parents select the traits of their future offspring instead of leaving it to „nature’s lottery” what they will be is somehow present in all of these books.

GEHB plays a major role in all of these projections. Not only would the body-related enhancements require an appropriate endowment of the brain as well (e.g., new sensory powers would have to be digested by a well adapted brain accordingly, more muscles require an the management of motor functions by the brain as a central unit accordingly; immortal brains would have to be equipped for the additional years of life, etc.), but also the genetic enhancement of the brain per se is a major topic of forecasts and speculations. The following list reflects the scope of the most common as-
sumptions of what GEHB might be able to achieve once it is fully developed:

- Better motor skills, quicker reaction, etc. (see above)
- More cognitive powers, such as
  - Faster learning,
  - More intelligence,
  - More memory
- Better mood (it varies from author to author whether this means control over good and bad feelings or simply „installed permanent happiness“ or a combination of the two)
- Desire control, for example
  - Appetite for food (like eliminating the genetic reasons for obesity)
  - Sexual desires
  - Anger control
  - „Ego control“ and altruism
  - Better control of criminal behavior
  - Etc.
- The modification of various other traits such as
  - Male-female differences
  - Curiosity and creativity
  - Productivity
  - Risk aversion or fearlessness
  - Etc.

Most of the projections published do not explicitly tell us the assumed timeline. They offer explanations concerning the way technological developments will take place only to a very limited extent. I did not find any studies of large corporations, universities or governments that offer more serious consideration and thought on a professional technology forecast. It is nearly impossible to determine whether they do not exist at all or whether they just have not been published. So there is a possibility that all of this published material is based on exaggerated technology forecast assumptions. The most elaborate and convincing explanation on how genetic en-
hancement technologies may develop to become fully available within the next few decades is the „conversion theory” that Gregory Stock offers and that will be the topic of one of the next chapters below.

Of course there are a great number of pieces of non-fiction articles, books, declarations, statements, protocols, reports, studies, etc., that do not have GEHB as the main topic - or maybe not even genetic enhancement in general - but that are, nonetheless, an important source of philosophical thought relevant for coming to an ethical judgment on GEHB. Some publications stay rather vague on the imagined technology scenarios and focus on general statements concerning the development of the human species and the human living conditions. This seems to be particularly true for publications by European authors like Sloterdijk, Habermas, or Reich. Continental European philosophical thought on bioethics quite often seems to be mired in considerations about the legal status of the embryo (see for example Kirchhoff) and little material can be found in most of these publications about the issue of genetic enhancement. Pioneering in serious thinking about genetic enhancement seems to be, thus, very much a matter of Anglo-Saxon authors up to this point, with very few exceptions.

But the matter of human genetic enhancement in general and GEHB in particular is also taken seriously enough by the scientific community and by the political establishment. This is evident in interest shown by the United Nations, the European Council or „The President’s Council on Bioethics,” These institutions have produced interesting publications as well, in particular the latter has prepared two large reports published as books in 2002 („Human Cloning and Human Dignity”) and in 2003 („Beyond Therapy”). The Council’s Chairman Leon Kass has published many articles and books on his very cautious views on advancements in reproduction technologies over the years that also offer an interesting collection of ethical arguments on the issue of genetic enhancement (See for example Kass, 2002).

It is impossible to list and discuss all of the publications used for the writing of this book, nor would it make any sense at this point, so the small selection presented above shall be sufficient now.
1.4. What to Expect from the Coming Chapters

The description of the technology that is the focus of interest of this book will be the main topic of the next chapter 2, „A Brief Technology Update.“ It is important to have a minimum understanding of the status quo of scientific knowledge to make ethical judgments on it, so this is one thing that this chapter tries to provide in a very efficient way. GEHB is not an existing technology, but the product of forecasting, so the elements relevant for this forecasting are of some interest as well. Technology is being created in a complex interaction between scientific researchers, industry, markets and political forces in society and government, so it will only be possible to touch on some of the most important elements. It will not be possible to give an exhaustive account or an independent forecast.

After that, chapter 3 on „Ethical Positions on EHB Derived from Religion-Based Attitudes“ will try to give an overview on how the main religions of the world see genetic enhancement from there respective points of view. Religion is a potential legitimate source of ethical thinking as long as the arguments for or against genetic enhancement go beyond stating what God or any other religious authority says. However, this requires the provision of ethical or philosophical arguments that non-religious people or those from another religion could also agree to. To find out whether the main religions are and can be such a source of ethical or philosophical arguments at this point is the main question in this chapter.

Chapter 4, entitled „The International Search for Common Grounds of Humanity’s View of GEHB,“ reports on the attempts to come to international agreements on issues of modern biotechnology, explains the relevance of human rights, human dignity, traditional biomedical ethics, and anthropologists’ attempts to define human nature for the evaluation of GEHB.

The shortcomings of all of these approaches constitute the basis for what I label „evolution skepticism“ and will describe in chapter 5. This is a relatively new line of thinking that is based on a deep distrust and disappointment with the wisdom of nature. It culminates in the belief that we are allowed and we even should take human evolution into our own hands.

The chapter 6 on „Cultural Evolution and Technology Positivism“ is the next mental step when starting from frustration with nature and its results. It espouses t argument that technology has brought us mainly positive
things so far and that our ever-growing distance from nature is in itself a „natural“ development for the species Homo sapiens. Technology positivists argue that there is nothing wrong with this and we should continue on this road full speed ahead. The most important and relevant form of technology positivism in relation to GEHB is „transhumanism“ with its claim that human individuals have the right to use genetic enhancement technologies as extensively as they like for transforming themselves into „post-humans“ if they wish to do so.

In chapter 7, „Technology Skepticism“ will be portrayed as the counter position to Technology Positivism because it encompasses all the criticism in relation to the use of technology and how it has changed human living conditions. Technology skepticism contains elements of a general resistance to change due to fear of change for merely psychological reasons or due to a fear of loss in power or economic advantage. Technology skepticism also contains, however, well founded philosophical thoughts on the limits of human capabilities to control and foresee complex developments.

Chapter 8, the last chapter that is based on the analysis of published literature, is entitled „Biopolitics“ and describes the differing opinions on what the limits of parental liberty regarding the use of genetic enhancements should be, differing opinions on the techniques of regulation, etc.

Chapter 9, entitled „The Importance and the Structure of a Standard Agenda to Discuss GEHB“ is an outflow of the discussion in all the previous chapters. It contains the suggested agenda in the form of a standardized workshop agenda and the description of a few test runs used in workshops held in the United States, Germany and the Netherlands in 2006. More details about the design and the purpose and the results of these workshops will be provided in chapter 9.
PART (II) SCIENCE AND TECHNOLOGY
2. A BRIEF TECHNOLOGY UPDATE

2.1. Introductory Remarks

To be able to describe the ethical positions concerning GEHB, it is unfortunately indispensable to describe the relevant technologies to some minimum extent as well. This is a difficult task in a book about philosophy for two reasons:

- For one thing, the philosopher as a non-expert in genomics and brain research is walking on thin ice by virtue of not having professional insights into the latest laboratory results that could make some of the more detail-oriented ethical arguments outdated quickly. On the other hand, this is exactly the situation that the general society and its policy makers are in as well. Perhaps the fresh and untainted view of a non-scientist „outsider“ is much more appropriate for producing instructive philosophical results and understandable communication than what can realistically be expected from highly specialized scientists who less in touch with mainstream thinking.

- The second difficulty is to find the right balance between completeness and briefness. The intention of this chapter is to describe the technology in question sufficiently so that it is clear in the rest of the book what exactly we are talking about. On the other hand, this is and shall remain a book mainly about philosophy and not a summary of the latest status of biotech in its various forms.

Taking on the challenge of finding the right balance also means referring readers with a more detailed interest to the massive amount of excellent literature available on these topics. Publications that provide a comprehensive overview of the scientific aspects of the field of genetics and the brain include:

• Marcus: The Birth of Mind – how a Tiny Number of Genes Creates the Complexity of Human Thought (2004)
• Ridley: Genome (2000)

Besides, a lot of easy-to-understand information on genetics is also provided by various websites, for example the website of the Centre for Genetics and Society www.genetics-and-society.org. This organization is not neutral, it is an anti-enhancement advocacy group, but the information provided on the website is largely an account of unbiased facts written in a very brief and clear form.

2.2. Genetics

2.2.1. Genes, Cells, Organisms

When James Watson and Francis Crick discovered the double helix structure of the DNA in 1953, a major leap towards the full understanding of how genes determine the body and the mind of human beings had been made. But even today, more than 50 years later, we are still not there. In fact, we are still far away from a full and complete understanding of this subject. The reasons can be understood best by looking at the numbers that describe the complexity of the system that determines the shape and the development of the human brain.

The human body consists of approximately 1,000 billion cells. Each cell contains two sets of 23 chromosomes. Each chromosome contains several thousand genes; the total number of genes is estimated to be some 20,000 to 30,000.

Each gene consists of a set of codes that are contained in the order of the bases that are to be found somewhere on the string of 3 billion bases that make up human DNA. Looking at a DNA string and trying to find the genes is like looking at a library full of books written in a foreign language.
that we do not speak. Imagine that the books contain three billion letters and we are trying to identify words and understand their individual meanings and of the whole text, even though the language is unfamiliar – indeed, we do not speak a single word – and it contains no familiar characters such as commas, periods or anything else that would help us orient ourselves. This is the situation that genomics encountered in the beginning.

A gene could consist of only ten base elements or of a few ten thousand base elements. Those sets of base elements can be split up into chapters or not. In order to make them produce proteins, they have to be turned on and off by specific chemical signals at the right time. The same gene might have completely different functions in different phases of the development of an embryo and the same gene might be responsible for the production of several different proteins under different conditions. The unofficial world champion in alternative splicing is the gene DSCAM in the drosophila fly that has been found to be able to produce 38,016 different forms of proteins. Yet nobody knows exactly how the gene knows when it is supposed to produce which kind of protein.

Concerning the human brain, some scientists assume that only around 1,000 to 3,000 genes are responsible for the production of the brain with its 100 billion neurons. These are in turn organized in a very complex way and each of them consists of many thousands of variants of protein molecules. Some genes do not produce proteins at all but have other functions. Most proteins are not produced by one gene but by several of them, even though the number of variants of proteins (there are several hundreds of thousands of them) exceeds the number of genes (approximately 20,000 to 30,000) by far. And genes also interact with other genes, thereby making the determination of any linear kind of relationship practically impossible.

Given this complexity it seems inconceivable that any pattern can be recognized and any of the genetic codes can be deciphered at all. But the reality is that a lot of progress has been made and at a surprising speed.

McKibben (page 70) points out that „when the Human Genome Project was first proposed, critics said it would take 10,000 years; its backers said they would be done by 2010.“ Stock (pp. 40-41) describes what really happened: „In 1985, Robert Sinsheimer, the chancellor of the University of California at Santa Cruz; Renato Dulbecco, an Italian Nobel laureate at the Salk Institute; and Charles DeLisi, the director of the Department of Energy; independently proposed projects to sequence the 3 billion base human genome. Only
four years later, the Nobel laureate James Watson was at the helm of a $3 billion NIH effort allied with International Human Genome Organization projects in Italy, Japan, France the United Kingdom, and other countries. Considering that the longest sequenced contiguous DNA in our genome at the time was the 67,000 base gene for human growth hormones, the goal of sequencing the entire genome in fifteen years, using as yet underdeveloped technologies, was audacious. Nonetheless, in June 2000, years ahead of schedule, Craig Venter, the CEO of Celera Genomics, and Frank Collins, the director of the Human Genome Project, announced the completion of a rough draft.”

Increasing knowledge does not simply result in an accumulation of this knowledge, but also leads to the development of more efficient research techniques and thereby to an acceleration of the accumulation of knowledge process. For example, once sequencing had brought knowledge about a few genes, the development of robots for high-speed automated sequencing was the next logical step. This self-feeding cycle between research results and research methods and the resulting acceleration effect is one of the major difficulties for forecasting technological development. Thus, pure linear extrapolation is almost always wrong.

Even after the completion of the Human Genome Project, our knowledge about the functioning of our genes remains very limited. We may know what the genes are, but in most cases we do not understand what they do or what exactly triggers them to fulfill their varying functions. It should be noted that the genome of Homo sapiens is only slightly different from the genome of other species. For example, 98% of the genome of humans and of chimpanzees is identical. To quote Ridley (Ridley 2000, page 29): „How can this be? There is nothing about chimpanzees that looks 98% like me. Oh really? Compared to what? If you took two clay models of a mouse and tried to turn one into a chimpanzee, the other one into a human being, most of the changes you would make would be the same.“ Or to put it in the Darwin’s words: „Man with all his noble qualities still bears in his bodily frame the indelible stamp of his lowly origins.“

Not only do we not know a whole lot about the functioning of our general human genome, we have even less of an idea about the individual variety amongst members of the human species. Traditionally, the focus of the research was on finding ways to identify individuals by comparing two samples of their DNA, the so-called genetic fingerprint. This comparison, however, is most efficiently done by taking a random piece of DNA and then de-
liberately ignoring the genes. Contrary to popular belief, the most significant differences between two individuals' genomes cannot be found in the genes. The genes have been subject to evolutionary selection and therefore tend to be more similar within a species than the large part of DNA string that does not contain any genetic information.

But now that the Human Genome Project has successfully finished - in an amazingly short period of time - the focus of the researchers is slowly but surely shifting. The goal of identifying the individual differences in the genome of human beings and to compare them with individual traits has been taken on by a number of recent large scale research projects. The complete sequencing and filing of all of the 280,000 inhabitants of Iceland is just one of the more prominent ones.

In addition, with much less publicity than the Human Genome Project but with a similar setup, the Human Proteom Organization (HUPO) was established in 2001. It pursues the goal of identifying and categorizing all the proteins that make up the human body. The human’s proteome is another world of complexity. Here is the encyclopedia explanation provided by the Wikipedia website (copied in January 2nd, 2006 from ttp://en.Wikipedia.org/wiki/Proteomics):

„Proteomics is the large-scale study of proteins, particularly their structures and functions. This term was coined to make an analogy with genomics, and while it is often viewed as the „next step,“ proteomics is much more complicated than genomics. Most importantly, while the genome is a rather constant entity, the proteome differs from cell to cell and is constantly changing through its biochemical interactions with the genome and the environment. One organism will have radically different protein expression in different parts of its body, in different stages of its life cycle and in different environmental conditions. This technology is instrumental in biomarker discovery. The entirety of proteins in existence in an organism throughout its life cycle, or on a smaller scale the entirety of proteins found in a particular cell type under a particular type of stimulation, are referred to as the proteome of the organism or cell type respectively. With completion of a rough draft of the human genome, many researchers are now looking at how genes and proteins interact to form other proteins. A surprising finding of the Human Genome Project is that there are far fewer protein-coding genes in the human genome than there are proteins in the human proteome (~22,000 genes vs. ~400,000 proteins). The large increase
in protein diversity is thought to be due to alternative splicing and post-translational modification of proteins. This discrepancy implies that protein diversity cannot be fully characterized by gene expression analysis alone, making proteomics a useful tool for characterizing cells and tissues of interest. To catalog all human proteins and ascertain their functions and interactions presents a daunting challenge for scientists. An international collaboration to achieve these goals is being coordinated by the Human Proteome Organization.”

2.2.2. The History of Genetics – a Brief Overview of an Amazing Success Story

1953 - Structure of DNA deduced (Watson, Crick, Wilkins, Franklin).
1968 - DNA code deciphered
1973 - First recombinant DNA experiments (in bacteria)
1978 - First “test-tube baby“ (in vitro fertilization)
1978 - First germline engineered mammals (mice)
1980 – U.S. Supreme Court rules in favor of patents on genetically engineered organisms
1982 - First proposals for human gene transfer experiments
1985 - Recombinant DNA Advisory Committee (RAC) says „no germline modification at this time,” but approves somatic gene transfer experiments.
1988 - Launch of Human Genome Project
1991 - First somatic gene transfer experiments begun (W. French Anderson)
1996 - First mammal cloned (sheep Dolly, in Scotland, by Ian Wilmut)
1998 - W. French Anderson submits first proposal involving germline modification to the RAC of the National Institutes of Health.
1999 - Human artificial chromosomes under development
2000 - „Working draft“ of the human genome sequence announced.
2001 - Eduardo Kac publicizes the creation of a rabbit genetically modified to glow green under fluorescent light as a work of art.
2001 - Fertility researchers Severino Antinori and Panos Zavos announce their intention to clone a human being within a year.
2001 - The Jones Institute for Fertility in Virginia announces the creation of human embryos for experimental uses. Advanced Cell Technologies (ACT) in Massachusetts acknowledges attempts to create cloned human embryos.

2001 - Fertility experts announce they will begin to offer Preimplantation Genetic Diagnosis (PGD) for use in sex selection to clients.

2002 - Scientists at Texas A & M University announce that they cloned a cat in December, the first cloning of a pet.

2002 - Clonaid and Raelians claim to have created human clones, but later this is shown to be a hoax.

2003 - The first complete sequence, accurate to 99.999%, of the genetic code of a single human is announced.

2003 - A mule and a horse are cloned.

2003 - Chimeric stem cells are reported to have been derived from hybrid rabbit-human cloned embryos.

2003 - Researchers grow mouse sperm cells from stem cells and fertilize an egg.

2004 - A mouse is born with two female parents and no male parent.

2004 - The birth is announced of siblings selected with the use of Preimplantation Genetic Diagnosis (PGD) to provide stem cells for children suffering from non-genetically transmitted diseases.

2.2.3. Gregory Stock’s Conversion of- Technologies Theory

The core of the „conversion of technology theory“ that was proposed by UCLA’s Gregory Stock in his book „Redesigning Humans“ is the assumption that the parallel advancement in seemingly „harmless“ and generally desired and accepted research goals will one day merge into a technology package that will make targeted genetic enhancement possible. He assumes the following factors will come together to form the basic ingredients for a technology mix that could turn out to be genetic enhancement technology without somebody realizing it until it is „too late:“
Gregory Stock could hardly be accused of being an opponent to genetic enhancement, but his certainty about its development according to his conversion of technology theory is based at least in part on wishful thinking.

In particular, the reliance on the development of „artificial chromosomes“ shows this inherent technology optimism and has drawn the fire of opponents in the debate. Stock (Stock, 2003, pp. 65-72) claims that the development of artificial or „auxiliary“ chromosomes as carriers of artificially combined genes could open a whole new world of genetic modification technology. According to Stock, not only is it easier to insert artificial and new genes instead of altering existing ones, it is also a lesser risk since existing genes might have multiple interrelations with other genes or functions that
might be not completely known, thus any alteration of an individual’s genes could have undesired side effects. Besides, new genes in artificial and auxiliary chromosomes could be managed in a whole new different way. They could be designed such that they are turned on and off with signaling elements designed especially for them. This would enable parents to make the decision to install the genes for certain traits, but the trigger to set the genes in motion could be initiated later by the child carrying the genes – if the child decides to do so. This way, one of the greatest causes for unease with germline modification, i.e. – the fact that irreversible decisions about the genetic structure of the child are left to the parents, could be avoided. Stock believes that there could also be „one generation genes.“ These would determine the body and mind of one person but are not contained in the egg sperm cell and are therefore not passed on to the next generation. This would eliminate the problem of mistakes in genetic engineering being passed on from generation to generation in eternity. Stock says (page 71): „In other words, we could take a pill to discard our auxiliary chromosome exclusively from our sex cells and thereby keep it and all the genes on it from reaching the next generation.“ The basis of Stock’s projection on the use of auxiliary chromosomes is a few breakthrough experiments in 1997 and 1998 that Stock describes in his book „Redesigning Humans“ on pp. 65-71.

Other authors caution that those basic successes should not be overvalued and that Stock’s visions could be a bit too far reaching (see, for example McKibben, 2002, page 192). In general there are a lot of critics claiming that Stock promotes a technology that is neither ready to use nor desirable for a number of reasons in a very naïve and sensationalist way. For example, McKibben reports that Stock organized a conference in 1998 with the title „Engineering the Human Germline“ where only proponents of this technology were invited and were James Watson spoke the famous words „If we knew how to make better humans … why shouldn’t we?“

For Stock the development towards what he calls „GCT = Germinal Choice Technology“ is not a question of „if“ but merely of when and how. The 2002 hardcover version of his book „Redesigning Humans“ had the subtitle „Our Inevitable Genetic Future“ and was diplomatically changed into „Choosing our Genes, Changing our Future“ for the 2003 paperback version. We shall still consider later what to think of this deterministic vision. At the moment we should only realize that the „normal,“ „straight-line“ development, that anti-enhancement activists assume and monitor, might indeed turn out to
be a somewhat naïve view of things. Stocks conversion of technology theory is by far the most plausible and all-encompassing technology forecast concerning genetic enhancement technologies that can be found in the relevant literature. Therefore, it seems to make sense to give a brief overview of some of the crucial research areas that Stock bases his forecast on.

### 2.2.4. Modern Reproduction Technologies

**In Vitro Fertilization (IVF)**

As can be seen from the history timetable above, the first step to reproduction technology had only very indirectly to do with genetics: in 1978 scientists succeeded for the first time in fertilizing an egg cell in glass petri dishes (*in vitro*) and implanted this fertilized egg into the mother’s womb. The purpose of this procedure was to enable the desperate parents of Louise Brown, the girl who developed from this egg cell, to have children at all.

Should the egg cells of the woman or the sperm cells of the man be genetically incapable of producing an embryo, then couples depend on a foreign donor providing a substitute. This is done nowadays in many cases and in many countries in a safe and well regulated way. Even though the donor is usually kept anonymous for psychological reasons, it is equally normal that the provider of the donor cell provides the couple who wants to use the cell with a description of the donor’s traits, like race, height, hair color, education, professional background, etc. The idea is to assure the couple that the looks and the traits of the child will allow the parents-to-be to keep their decision confidential. Perhaps they do not want to tell their family and friends that they had to use a donor sperm cell, which could be difficult if the looks of the parents and their IVF-child, turn out to differ completely. But implicitly, this also opens the door to selection. For example, McKibben reports (McKibben, 2003, page 32) of advertisements in which parents were seeking egg cells of a donor with very specific ideas about physical features but also with very detailed IQ-related requirements and offered $50,000 to any potential donor. A non-fiction book published in 2005 by David Plotz, *The Genius Factory*, describes the attempt of an American multimillionaire in the 1980s to „breed“ humans with above-average intelligence by using egg or sperm cells of highly intelligent people in IVF reproduction.
Even though the birth of the first test tube baby was a well publicized event and a much resisted image in 1978, IVF is today a well known and often used technique. Stock (Stock, 2002, page 53) reports that in 1998 in the United States alone 28,000 babies were born this way and 80,000 IVF-attempts were performed. Stock also describes (page 55) the brutal procedure that women must endure in a shockingly detailed way. Neither this, nor the considerable costs involved (mostly not covered by health insurance companies) are a barrier for those couples who are desperate to overcome their genetic impediment to developing a fertilized egg the natural way.

Human infertility has developed into a worldwide multi-billion dollar market for the medical industry that is still growing. Infertility is a growing problem. The alternatives, such as adoption, are less available today and have never been really attractive for many couples. In Germany, for example, there are many more parents seeking a child to adopt than available infants. Many couples today therefore travel to Third World countries and adopt children from desperately poor parents there, which is becoming more and more a hot legal and ethical issue. IVF is for more and more people with fertility problems the only acceptable option, which continues to fuel further research and refinement of the methods in this area. With this it will be possible to generate knowledge on how to store and treat egg cells, sperm cells, embryos in a very early stage, how to implant the 6-10 cell embryo into the mother’s uterus safely and efficiently, etc. – all valuable know-how for developing further steps in reproduction technologies.

**Pre-Implantation Genetic Diagnosis (PGD) and Screening**

The following text was copied from the website of genetics and society.org on January 2nd, 2006:

„Pre-implantation genetic diagnosis (PGD) tests early-stage embryos that were produced through in vitro fertilization (IVF) for the presence of a variety of conditions. One cell is extracted from the embryo in its eight-cell stage and analyzed. Embryos free of conditions that would cause serious disease can be implanted in a woman’s uterus and allowed to develop into a child. PGD allows couples at risk of passing on a serious genetic disease to have a child that is fully genetically related to them and that does not carry genes for the disease. It does not involve the manipulation of genes in embryos; rather, it selects among embryos. To date, PGD has been most widely used to prevent the birth of children with chromosomal diseases such as Down’s Syndrome, and with other genetic disorders, including Tay-Sachs disease,”
cystic fibrosis, sickle cell disease, Huntington’s Chorea, and Cooley’s anemia.

„People who oppose the destruction of human embryos in general are necessarily opposed to PGD; however, for some, PGD is preferable to aborting a fetus affected by a medical condition that has been identified through prenatal screening. Pre-implantation diagnosis and selection is also controversial because it can be considered a eugenic technology. Many disability rights organizations, in particular, have been critical of its uncontrolled use, and point out that the definition of „disease“ is to some extent subjective. Most disability rights advocates who criticize PGD and prenatal screening nonetheless support abortion rights. They believe that a woman should be allowed to decide whether or not to have a child at a given time, but not to base this decision on the traits of the particular embryo. Many people fear that PGD will be used to select a child of a preferred sex. PGD could also be used in attempts to select a future child’s cosmetic, behavioral and other non-disease traits.

„However, the genetic laws of independent assortment make it difficult for PGD to be used for any traits that depend on two or more genes. Thus, PGD provides an alternative to germline modification as a way to prevent the births of children with serious genetic diseases, most of which are single-gene disorders, but does not open the door to escalating and species-altering applications."

„In the technique known as pre-implantation screening, couples at risk of passing on gene-related disease use in-vitro fertilization to conceive several zygotes, after which those found to be free of the harmful gene are implanted and brought to term. No modification of genes is required."

**Stem Cell Technologies**

The following text was copied from the website of genetics and society.org on January 2nd, 2006:

„Stem cells are unspecialized cells capable of developing into a variety of specialized cells and tissues. Researchers are investigating how to culture them and control their differentiation, in the hope that they can be used to generate tissues or organs to treat a variety of diseases. Stem cells can be derived from a variety of tissues. Adult, fetal, placental, umbilical, and embryonic stem cells all have different properties. Adult stem cells can be obtained from the blood, bone marrow, brain, pancreas, and fat of adult bod-
ies. Embryonic stem cells are found in very early embryos, and can be obtained from „supernumerary“ or „leftover“ embryos donated by couples undergoing in vitro fertilization (IVF) treatment. Scientists have also derived embryonic stem cells from clonal human embryos. Some researchers are particularly interested in using embryonic stem cells in research because they are totipotent, which means they are capable of developing into all tissue types. Other stem cells, such as adult stem cells, are generally thought to be multipotent, which means that particular types of adult stem cells are capable of developing into a limited number of tissue types. The exact potency of adult stem cells—both of individual types, and of adult stem cells taken as a group—is still an issue of debate among research scientists. Some recent studies suggest that adult stem cells may be as flexible as embryonic stem cells. Medical researchers are also debating the relative safety of different kinds of stem cells. For instance, some researchers claim embryonic stem cells are difficult to control, because of their flexibility and tendency to proliferate rapidly. In fact, embryonic stem cells often behave similarly to cancer cells and have developed into tumors in some animal experiments. It has been argued that adult stem cells are much easier to control and less likely to behave in a tumor-like fashion and are thus more suitable for research. Research using stem cells derived from adult tissues is almost universally supported. Research using stem cells derived from embryos created in the course of in vitro fertilization procedures is widely supported except by those who object to the destruction of human embryos.

**Genetic Modifications**

The following text originates from the website of genetics and society.org, January 2nd, 2006:

„ Genetic modification means changing the genes in a living cell. There are two types of genetic modification: non-inheritable genetic modification and inheritable genetic modification.

*Non-inheritable genetic modification* changes the genes in cells other than egg or sperm cells. Such changes are not passed to future children. Applications of this sort are currently in clinical trials, and are generally considered to be socially acceptable (See below, Somatic Gene Therapies).

*Inheritable genetic modification (IGM)* changes genes in eggs, sperm, or very early embryos. These changes not only affect the child immediately born but are passed down to that child’s descendants as well, in perpetuity. This ap-
plication is by far the more consequential, for it opens the door to the reconfig-
uration of the human species (see below, Germline Modification).

[Note: The term somatic comes from the Greek soma for „body.‘‘ The term germline refers to the germ or germinal cells, i.e., the eggs and sperm.]

**Somatic Gene Therapies**

The following text originates from the website of genetics and society.org, January 2nd, 2006:

„Somatic gene transfer involves adding genes to cells other than egg or sperm cells. If you had a lung disease caused by a defective gene, scientists might be able to add a healthy gene to your lung cells and alleviate the disease. The new gene would not be passed to any children you may subsequently have. The desired gene is attached to a viral vector, which has the ability to carry the gene across the cell membrane. Clinical trials of somatic gene transfers have been underway since 1991. These attempts at somatic gene therapy have so far produced very few successes and a number of serious adverse results, including deaths. But somatic gene transfer may eventually become an effective treatment for at least some important medical conditions.“

In 1990 for the first time genetically modified T-cells (define T-cells here) were injected into a young girl’s body in the hope to save her from an otherwise incurable, genetic weakness of her immune system. The therapy had officially been approved and was a success. Up to today several hundreds of gene therapies have taken place, but not all of them were a success. In 1999, however, a gene therapy lead to the death of a man in the University of Philadelphia hospital, making the world aware of the difficulties and risks still connected when trying to get genes under control. During the somatic gene therapy the modified gene is transported to the place that has to be „repaired,“ where it then takes over and replaces the defective tissue. The same happens with replacing lost tissue, such as due to an accident, except that no genetically modified genes are used.

**Germline Modifications**

The following text originates from the website of genetics and society.org, January 2nd, 2006

*Germ line modifications (also called „inheritable genetic modifications“*) would change genes in eggs, sperm, or very early embryos. The modified genes
would appear not only in any children that resulted from such procedures, but in all succeeding generations. This application is by far the more consequential, because it would open the door to the alteration of the human species. Genetic modification occurs by inserting genes into living cells. The desired gene is attached to a viral vector, which has the ability to carry the gene across the cell membrane. Proposals for inheritable genetic modification in humans combine techniques involving in vitro fertilization (IVF), gene transfer, stem cells and cloning.

Germline modification would begin by using IVF to create a single-cell embryo, or zygote. This embryo would develop for a few days to the blastocyst stage, at which point embryonic stem cells would be removed. These stem cells would be altered by adding genes using viral vectors. Colonies of altered stem cells would be grown and tested for successful incorporation of the new genes. Cloning techniques would be used to transfer a successfully modified stem cell nucleus into an enucleated egg cell. This „constructed embryo“ would then be implanted into a woman’s uterus and brought to term. The child born would be a genetically modified human. ....

Inheritable genetic modification (also called „germ-line engineering“) is currently being used to create „transgenic“ animals for commercial and research purposes. Some scientists and others are advocating its acceptance and use for human beings. Many nations have banned inheritable genetic modification, but the United States and many other countries have not. „

Genetic enhancement of animals also provides opportunities for accumulating technical expertise and has been a rich source of scientific and technical advancements of various kinds in the past. One of the more well-known experiments in this respect was published in the 401 edition of „Nature“ pp. 63-69 in 1999, in which researchers produced transgenic „Doogie“ mice to test whether they could genetically enhance learning and memory. Transgenic and normal mice were subjected to associative emotional memory tests, emotional learning tests through fear extinction, and spatial learning tests. The Doogie mice outperformed the control mice, leading the researchers to believe that genetic enhancement of memory and intelligence is possible in mammals. In 2000, in the number 282 edition of Scientific American, pp. 62-68, one of the researchers that developed the „Doogie“ mice reports that a higher amount of protein called the N-methyl-D-aspartate (NMDA) receptor was present in the transgenic mice. The NMDA receptor fortifies the connection between two simultaneously active neurons, and this strengthening is believed to be the
foundation for memory and learning. The research indicated that, when compared to control mice, the Doogie mice were better able to form new memory due to their NMDA receptors remaining open for a longer period.

**Cloning**

From the history account above one can see that quite a number of various animal clones have been produced since the first cloned animal ever (sheep Dolly) was born in 1996. The technology is far from being exact and easy. A total of 277 fertilized eggs and 29 implantation attempts were needed until one fertilized egg cell of the donor sheep developed into Dolly. The resulting sheep was not a very healthy creature, either, and died early.

The reasons for animal cloning are mostly commercial, being used for purposes such as improving livestock in agriculture, for pharmaceutical applications such as the production of certain proteins in animals that can then be used for the medical treatment of humans, etc. Many, if not all of the commercially produced clones, were produced to test or apply a modified gene. In fact, genetic enhancement of animals is already happening on a significant scale every day.

But there are also other intentions behind animal cloning, e.g., testing the effect of modified genes in mice out of purely scientific motivations, or exotic purposes like replacing a beloved pet, or the „artistic“ effect of a mouse or a rabbit that glows under infrared light because its genome has been supplemented with the corresponding gene of the jellyfish. The Chinese government officially supports an ambitious project to clone the endangered Panda to increase its chances of long term survival. The cloning of tigers and other rare animals has been tried for the same reasons, but so far not successfully. (For a full account of the known cases of animal cloning up until 2004 see the website of genetics-and-society.org)

So far, no primate has been cloned but the research in this direction is going on with full speed (An example of such biotech research in China is cited in Technology Review, June 2005). The cloning of a chimpanzee or a gorilla would be an easy-to-understand signal for the whole world regarding the capabilities of advanced genetic engineering: If it is possible to clone our most related neighbors in the system of species, then why not ourselves? This seems far fetched at the moment given the fact that the typical failure rate of a cloning process is over 97 % (only 3 % of the implanted fertilized cells survive in the uterus). Besides, there are reports about the unusually
poor health of many clones. But with more and more experience being accumulated and systematically evaluated, it would be just inconceivable that there is no progress at all towards making the procedure more safe and effective.

There are no laws prohibiting animal cloning or modifying genes of animals in any way one can think of in almost any countries on Earth. Animal-protection activists already have a packed agenda with problems ranging from endangered species to the dismal situation of animals in agriculture. So experimenting and the race towards technical perfection go on speedily and future scenarios include even projects like developing an artificial womb for certain species that could be much more reliable than the natural womb of female creatures, thereby avoiding the uncertainties of pregnancy and birth as well.

What exactly is cloning?

(The following text originates from the website of genetics and society.org, January 2nd, 2006)

„Cloning is the creation of a genetic duplicate of an existing organism. Human cloning starts by creating a human embryo that carries the same set of genes as an existing person. If this embryo is used for research purposes—say, for generating some types of stem cells—the process is called research cloning. If instead the embryo is implanted in a woman’s uterus and brought to term to produce a child, the process is called reproductive cloning.

Reproductive Cloning would be done by taking the nucleus from a cell in an existing person, putting it into an egg whose nucleus has been removed, and implanting that clonal embryo into a woman’s womb to be brought to term. The baby, and later the child and adult, would be the genetic duplicate of the person from whom the original cell nucleus was taken. A person created in this way would not have a genetic mother or father, as we understand those words, but instead a ‘nuclear donor’ – so just one person.

Research cloning uses somatic cell nuclear transfer to produce a clonal embryo. Sometimes called 'embryo cloning' or 'therapeutic cloning,' it would begin with the same procedure that would be used for reproductive cloning: the nucleus from a body cell is put into an egg from which the nucleus has been removed. The resulting entity is triggered by chemicals or electricity to begin developing into an embryo. Instead of being implanted in a womb
and brought to term as a cloned child, the embryo would be used for research purposes—for example, to generate embryonic stem cells.

Most scientists agree that research cloning for medical research is not needed as a source of embryonic stem cells—these can be obtained from embryos generated by in vitro fertilization. Rather, researchers have proposed that research cloning may turn out to be useful for producing ‘customized’ embryonic stem cells that could generate compatible replacement tissues for individual patients. Replacement tissues generated in this way would presumably not be rejected by a patient’s immune system, since their genetic make-up would be the same as that of the patient. Another proposal is for research to use research cloning to create stem cells with genetic conditions that cause diseases in order to study the diseases. ...

Advocates of human reproductive cloning hope to make it happen before a global ban is in place, in the expectation that opposition will weaken in the face of a fait accompli. Estimates as to when we could expect the birth of a human clone, if no action is taken to prevent this, range from immediately to five or ten years.”

The development of genetic enhancement technologies does not necessarily depend on cloning, even though it would make it much easier to control the process. A more important aspect about human reproductive cloning is that it would increase our knowledge about the relevant microbiological processes tremendously. After all, the key to developing GEHB technologies is exactly this kind of know-how.

Research for Collecting Data on the Relevance of Specific Genes for Specific Traits

The availability of individualized genetic information and knowledge about the correlation between certain traits and genetic endowment is needed for designing individualized genetic medical treatment.” Therefore, it has become a major object of research during the last ten years.

Take drugs, for example. Right now pharmaceuticals are designed such that all Homo sapiens can use them. Testing as well as safety is a major issue. The required time and money for developing a new medical drug entails seven years and $ 400 million on average (Stock, 2003, page 48). In addition, the interest of individuals in finding out about their own genetic predisposition towards genetic diseases will increase as the technology of finding out becomes cheaper. Experts interviewed by the Chicago Tribune (see this pa-
per’s front page article on June 26th, 2005) indicated that people are very interested in the possibility of individualized genetic medical treatment. Most people receive information about genetically caused negative dispositions with great calmness and use the information to decrease the likelihood of problems arising by changing their lifestyle.

The DNA chip, consisting of a small chip containing DNA samples, would be a very efficient tool to research the many millions of varieties between human genes. The project to collect the genetic profile of all the 280,000 inhabitants of Iceland and to compare them with their health record was already mentioned above. Other, similar projects are on the way in Estonia (population 1.4 million people) and in the South Pacific (Stock, 2002, page 49). For the Centre for Genetics and Society this seemingly harmless pharmaceutical research could be the starting point of an unstoppable development simply due to the knowledge acquired. This fear correlates with the view of Gregory Stock’s conversion of technology theory in a very clear way as the following graph indicates:

WHERE DO WE DRAW THE LINE?

<table>
<thead>
<tr>
<th>Pharmaceuticals</th>
<th>Diagnostics</th>
<th>Somatic Therapies</th>
<th>Pre-Implantation Selection</th>
<th>Creating Research Embryos</th>
<th>Creating Human Clones</th>
<th>Inheritable Genetic Modification</th>
<th>Genetic Castes</th>
<th>Post-Humans/ Sub-Humans</th>
</tr>
</thead>
</table>

Source: website of genetics-and-society.org, January 2nd, 2006
2.3. Enhancing the Human Brain?

2.3.1. Case Study (1): Huntington’s Disease

In opinion surveys conducted in various countries, high percentages of the people interviewed say that they would find germline modification acceptable in cases where it is used for curing genetic diseases.

One of those diseases frequently listed as one of the targets of genetic research is Huntington’s Chorea.

The symptoms of the disease are an increased involuntary jerking of muscles that caused people to give it the name „Veit’s Tanz“ in German. In 1872 George Huntington discovered that it is a clearly congenital disease and therefore it is now internationally known under his name. In 1993 the gene that causes the disposition for the disease was discovered and named Huntington. In their 2005 article about the disease, Jürgen Andrich and Jörg Epplen, both scientists at the Huntington Center in Bochum, Germany, describe the causes and the possible cures for the disease (see „Gehirn und Geist“ 11/2005 pp. 34-38): Huntington is a gene on chromosome number 4 that regulates the development during the embryo stage in higher developed animals. It seems to be an important gene because when it is knocked out in the embryos of mice, those embryos die. The pathological functioning appears when the gene is longer than it is in normal persons. Usually the base-combinations catosin, adenin and guanine that form a glutamine bloc appear 10-30 times on the DNA string. If it appears more than 37 times, then the carrier will get Huntington’s Chorea with an almost 100% certainty. Usually the symptoms appear for the first time at the age 35-45 and end with death as the faulty functioning of the gene leads to a continued destruction of certain brain areas. This destruction takes place when a pathologically long Huntington gene does not produce those proteins to the extent needed in the synapses to remove glutamate, which then constantly sends impulses to the connected cell, thereby damaging it. The latest research has provided indications that Huntington is responsible for regulating the outflow and the absorption of certain neurotransmitters, together with a protein that has been named HIP1 (Huntington Interaction Protein 1). A faulty Huntington gene is not capable of binding the HIP1 protein which has fatal consequences: the free floating HIP1 proteins form little protein lumps
which activates other chemical processes that inevitably lead to the death of the neuron. The activation of enzymes that try to break up and remove the protein lumps has not yet been fully researched.

In any case, there has not been any pharmaceutical solution found yet to cure the disease. So far, for the estimated few hundred thousand carriers of a prolonged Huntington gene, the genetic diagnosis is a sure death from the disease before age 50. Initial attempts to cure the disease with somatic gene therapies were promising but did not always function properly. In one case, in an attempt with patients in Tampa, Florida in 2003, the patients received an injection of neuronal stem cells from aborted fetuses. The hope was that those would replace the destroyed brain cells and reproduce in a non-pathological way, but some of the patients suffered from heavy bleeding in the brain as a consequence and their situation worsened.

With this clear link to a genetic defect and to a single gene, Huntington’s chorea is one of the prime targets for curing by genetic intervention. However, even though the visionary pro-enhancement authors like Lee Silver and Gregory Stock all mention the disease in their projections as one of the examples for the necessity of germ line modifications, nobody has yet dared to cross the Rubicon by proposing or even trying the intervention in a specific case. This would involve a cutting out of the superfluous glutamine elements from the DNA of sperm cells or the egg cells of the carriers of a faulty Huntington gene before a fertilized egg cell is produced from this cell. With the current state of technology this would necessarily involve an in vitro fertilization so that it is assured that only these modified cells form the blastocyst that can then be implanted into the mother’s womb. No doctor has gone that far yet, but as scientific progress has been very rapid in the last few years, that proposal can probably be expected at some point in the not too distant future.

Initial steps in that direction are happening already with a large number of PDG cases being performed on embryos in the 8-cell stage to diagnose the disease. As the likelihood of passing on the gene if only one of the two parents has it is as high as 50%, the desperation might rise and the call for solutions might become louder. The fact that lobbying has not been stronger so far is probably also based on the small number of known cases. There are only some 45,000 persons in Europe known to carry a faulty Huntington gene, and the number is similarly low at some 30,000 in North America. However, the real number might be much larger than that and the number of known cases is bound to increase as the genetic screening of adults be-
comes a cheaper and more usual practice. Since the results of the Human Genome Project have only been available since 2001, it remains to be seen how this will develop.

However, things are much more complicated when it comes to most other human traits that also develop as the result of interaction between several genes and a complex interaction of genetic and environmental influences.

2.3.2. The Complex Structure of the Human Brain

The shapes of the neuronal network or parts of it are at least partly determined by the protein production as it is initiated by the genes of an individual. Genes are basically little „protein production machines“ that are turned on and off following an intrinsic plan that is still to be fully discovered. The description of the faulty functioning of the Huntington gene gives a little glimpse on how complex those systems usually are.

However, genetic activity and protein production may also be determined by learned features, nutritional habits, patterns of physical activity, heat or cold from outside, etc. For example, a lack of protein in the food of children may inhibit their intelligence potential from fully unfolding simply because there is not enough „raw material“ for building the brain structures available for the „genetic protein factory.“

Brain structures are also built up to large extent by learning. „Learning“ from a neuron-scientific point of view mainly means strengthening or forming new connections between neurons, while its counterpart „forgetting“ mainly means weakening or giving up connections that are rarely or not at all used. Since the brain is constantly confronted with millions of signals that come in over the nerves from the outside world and from the inside of the body, and since it is those signals that trigger the formation, alteration and fading away of neuronal networks, there is no way of stopping this constantly ongoing transformation except with the death of the individual.

The human brain is primarily the central command unit of the human body. Large nerve bundles run from there into the spinal cord, the „information superhighway“ of the human body. Numerous smaller nerve bundles leave the spinal cord at many locations along the spine and split up into ever thinner and thinner bundles, forming a network of tiny strings that penetrate every microscopic corner of the body in order to allow the information flow
from and towards the „central unit“ which is located in our skull. So the peripheral nervous system ends and begins in the brain itself which has several clearly visible sections: At the upper end of the spinal cord the nerve bundles emerge into the brainstem. The brainstem controls most of the unconscious functions like heartbeat and lung function, therefore brain death is often defined as the death of the brainstem.

The brain of an adult human being has an average weight of some 1,400 grams and is basically an accumulation of densely packaged brain cells (neurons and support cells) protected by the upper half of our skull. The cerebral cortex, for instance, is really a sheet that is 2-4 millimeters thick, consists at most spots of six layers of interconnected brain cells and has a surface area of about one square meter when unfolded. The in-folding of this sheet gives the appearance of a ball very much like what we would get when we crumple a piece of thick cloth together (See Zeman, 2002 or Kendall, 2000 for a good overview description).

The crucial part of the brain is the neuronal network, but there is other organic material as well. Support cells are responsible for insulation, for embedding the neural network in a liquid called cerebrospinal fluid, veins are needed for transporting the oxygen supply into the brain, etc. Glial cells –of which there are twice as many as there are neurons in the human brain - take care of the removal of damaged cells but are also crucial for the control of many brain activities.

There are quite a number of single cell creatures in nature, like bacteria. Evolution has led to multi-cellular systems which can be defined as a multitude of cells that are bound together and can cooperate by following some coordinating mechanism. All of our organs, basically all the animals that we can see with the naked eye and, of course, the human body as a whole are all multi-cellular systems. Their advantages compared to single cell creatures become clear when we compare organisms to companies. It is the division of labor and professional specialization that enables the whole system to grow in size and quality. The more complex the system, the higher the specialization, and the more sophisticated the outcome that we can expect. A company with ten employees would surely have difficulties to produce and sell tens of different car models, whereas for DaimlerChrysler with several hundred thousand workers, this is daily business. Likewise, for the little worm C. elegans whose brain has 302 cells, it would be difficult to produce the same results as the human brain with 100 billion cells.
The brain of Homo sapiens is also a multi-cellular system in itself, a system with an enormous complexity. The human brain consists of around 100 billion neurons, which are brain cells specialized in processing information. Neurons have multi-headed endings that make them look like strange miniature plants with hairy branches. Those branches are the physical units for forming connections with other neurons, thereby forming a neural network. There are numerous variations of neurons when it comes to the number, shape and size of their connection units. Neurons can be a meter long; others measure less than a millimeter. Their shape might look like baskets, like chandeliers, etc. On average, each neuron has a number of 10,000 connection units attached to it, so it is on average in contact and communicating with around ten thousand other neurons.

*Samples of neurons; Source: Zeman, 2003, page 58*

If we multiply the number of neurons with the number of connections that they can form on average, we will get a figure that is impossible to fathom in its size:
100 billion x 10,000 = 1000,000,000,000,000 (1,000 trillion). To make this less abstract: Imagine that the world population of currently six billion humans is multiplied 15 fold to a number of 100 billion. Each of these 100,000,000,000 people has 10,000 telephones attached to their ears and is communicating with another person on each of these constantly open telephone connections simultaneously at any given moment. This would be a realistic macro-model of the neural network that we carry in our brain.

Of course, in order to describe the full scope of the complexity, we would have to do a few additional steps. These connections would have to be multiplied with the various types of neurons, which is a factor of a few ten thousand variants. We would also have to figure in that neurons and their connection units are not stable structures but are growing or shrinking constantly and to reflect what the brain learns or forgets. They might form new connections and give up existing ones. They might change in size, form, or activity level. Some neurons could also die completely and be removed by the system.

And then, like in the 10,000 telephone calls per participant above, there are many different ways of communicating. The way in which information is handled and forwarded in the brain is a process based on electricity and chemicals since electricity and chemicals are the means with which neurons can communicate with each other. Each neuron has the ability to transfer electricity into chemicals and back into electricity, following the basic principal of a rechargeable battery. This process happens at the connection point between the endings of neurons called synapses. The synapses of two neurons coming together establish their ability to communicate.

2.3.3. The Human Brain is a Highly Dynamic System

The human brain is, thus, a very active organism. When we are awake, our brain burns an average of 20% of the total energy consumption of our body and the electricity produced within the brain would be sufficient to keep a 20 Watt light bulb on all the time. In other words: there is constantly something going on in several parts of the brain and neuronal action happens extremely fast. Electrical „firing“ usually happens in frequencies of tens of times per second; various neurotransmitters appear in certain areas within seconds and disappear as swiftly as they have shown up because they have
been absorbed; the endings of neurons shoot out to grow towards another cell within a few seconds or minutes and they can shrink back equally fast.

This could again be compared to what happens in a telephone conversation, during which the spoken words, but also the modulation of the voice, the melody of the sentence, etc. can contain information. Similar to that there are also various ways to transfer different types of information between any two neurons, for example the frequency and the timing of the electrical firing contains messages; the nature of the chemical that is used as a so-called neurotransmitter contains information as well. The electrical firing can have frequencies ranging from 5 to 50 pulses per second and it can have varying rhythms, almost like in Morse code. The same neuron firing at a time when the surrounding neural area is stimulated can have a different meaning than its firing when this particular brain area is calm. The neuron can also send out pulses through one specific ending or through several endings.

So what seems like a simple binary method of messaging (electricity on or off) can in fact used in a multi-variation way, and neurons do use these possibilities of variety extensively. The development of the brain can only be understood when it is regarded as a dynamic process that goes on constantly with neuronal pathways being shaped and reshaped in a never-ending process that only comes to an end when the owner of the brain dies. This dynamic nature of the human brain and its constant change during the life span of an individual adds another huge dimension of uncertainty and unpredictability to its basic nature. Any enhancement would have to take into account these dynamics and be able to predict them based on a model that takes all of the millions of modification factors into account and weighs their importance for the dynamic development process. It is mainly the research of the 1990s and the first few years of the 21st century that has made the full scope of this dynamic flexibility of the human brain fully apparent.

The following graph gives a very simplified picture of this dynamic system (next page):
In all that follows in this book this very important fact should be born in mind: that genetic enhancement will be able to do no more than to modify natural predisposition that an individual has to live with. It, thus, can open up opportunities or it can potentially also set certain limitations. It cannot, however, determine a person’s development or make a person’s development more predictable than it is now.

Glenn Mc Gee’s famous statement that education might be the better method of brain enhancement in his book The Perfect Baby thus misses the
point. Seeking leverage on one end - with education - does not mean automatically that seeking leverage on another end with genetic enhancement - is better or worse per se. Both or none of the two might make sense and both have to be scrutinized in their ethical aspects as well. If your passion is animal training the sophistication of your training methods surely will play a major role in your success in teaching an animal to perform sophisticated tricks. But it surely will also make a major difference whether you chose to train a hamster or a dog – this is the difference between interfering into the dynamic development (such as by education) or into the basic structure (such as by genetic enhancement) of the human brain.

What makes enhancement of personal traits so difficult to manage is mainly the fact that according to current knowledge, the physical structure of the brain of individual human beings only determines the general predisposition of a person to develop certain personality traits. It does not, however, determine the behavior and the thoughts and feelings themselves.

Take, for example, one area that is relatively well researched, which is sexuality.

2.3.4. Case Study (2): Enhancing Sexuality?

First of all we must realize that it would be difficult to formulate one uniform enhancement goal that everybody on the world would agree to. Especially in case of the sensitive area of sexuality this is not difficult to understand: should there be more or less lust? Should there be more or less physical correlation with emotional love? Should that mean a life long monogamist type love relation or should that be something else? Should avoidance of homosexuality or of other sexual behavior deviating from mainstream be offered as an enhancement goal or should that be outlawed as an improper discriminatory act? Or what about the exact reverse: should it be possible that parents have their offspring „enhanced” such that they are purposefully turned into homosexuals? Should sexuality serve mostly as a trigger for a psychological urge to reproduce or should it mainly be a source of pleasure? It is not hard to imagine that a catholic cleric might have a completely different set of answers to these questions than, say an agnostic big city student in Scandinavia or a Japanese farmer. Consequently, any supplier of sexual enhancement technologies would have to be prepared for
performing a great variety of different kinds of “sculpturing.” The whole notion of “enhancement” sounds logical and plausible only at first sight. The devil is in the detail of world views.

But let us suppose more specifically for the sake of the scenario for this case study, that there are parents-to-be with a very liberal attitude who would like their future offspring to have increased pleasure from sexual activity by applying GEHB technologies. What would have to happen to enable a genetic engineer to fulfill their wish?

Sexual pleasure is in the very end mostly a function of the brain, but in order to perform what generates the sexual pleasure, the enhanced individual human would have to have a body that is equipped accordingly. For example, the sensory functions of the skin, the sense of smell, of hearing and the visual senses all have to be functioning well enough in order to allow the intake of sensory information that is important for producing the feeling of pleasure. Of course, the genitals also have to be formed and functioning in such a way that there is no impediment to producing the sensory information at the tip of the crucial nerve cells in the skin of the sex organs. Nor can there be any physical impediment for the transmission of these nervous signals into the brain.

But apart from these basics, things are very different depending on whether the child to be enhanced is male or female. For both together the basic purpose of sex is reproduction. To put it in Richard Dawkin’s words: “A person is only a gene’s way of making another gene.” Why there are males and females are not entirely clear to scientists, especially what the purpose of the male part exactly is (see Konner, 2002, page 262), since it is, in the end, the females who generate reproduction. There are many unisex species that have found other successful ways to cope with the necessity of mixing the gene pool for creating greater variety from which to choose the evolutionary optimum.

But the facts we have to deal with here are that the human species consists of two genders and they are equipped with a very different concept of sexuality. Whatever the evolutionary reasons for the existence of the two sexes are, there is no doubt that the enhancement consultants of the future would probably be confronted with the request for making a creature more male or more female because the person demanding the service thinks this makes life better for the offspring. All kinds of varieties could be imagined: The physical weak and often ridiculed nerd who wants his male child to be
more pronouncedly male, the abused woman who wants her female child to have more male characteristics to „make it easier for her,” the liberal parents who think that typical males are nothing but a source of trouble and that therefore their male offspring should have more female characteristics, etc. That there are differences in male and female brain structures is no longer in doubt, so surely there must also be something like „typical female” and „typical male” traits. In sex life, for example, males who are not able to have orgasms will not reproduce since the orgasm spasms are the precondition for the ejaculation of the sperm. If this is not done, then their genes will not be passed on and will quickly disappear from the human gene pool. Women, on the other hand, can successfully reproduce without any orgasms at all. Therefore women who have difficulties reaching orgasms will still pass on their genes.

Konner tries to give insight into the complexity of the biology of sex by pointing to the extensive research that has been done with rats and mice. He then comes to a conclusion about human sexuality (Konner, 2002, page 281): (summarize this quote, same comment as for above quotes – it is even more necessary here since this text is not understandable for the layman):

„The amygdale-hypothalamus connection plays an important role, partly through pathways from the hypothalamus to the midbrain, partly through hormonal influences of the hypothalamus on the pituitary gland and sex organs. In males, the pre-optic area of the hypothalamus is crucial for sex, while in females the ventro-medical hypothalamus plays the pivotal role. All these brain structures capture and concentrate sex hormones, as do some of the nerves outside the brain that are involved in sex. For example, the number of testosterone receptors in the pre-optic area shows a telltale difference between studs and duds among male rats. And a growing body of evidence implicates oxytocin in the sexual acts of males and females, as well as vasopressin, particular in males. These two hormones, derived from a common hormone in our reptilian ancestors, may be activated by estrogens and androgens. So limbic systems can respond to and influence the hormones of reproduction, as well as – over faster neural pathways – the sensations and acts of sex.

Not surprisingly, the estrogen receptor plays a great role in activating these circuits, as shown by Sonoko Ogawa and others in Pfaff’s lab. Parallel findings come from Emilie Rissman and her colleagues, in a paper brilliantly titled „Sex with Knockout Models” – sure to disappoint curious male undergraduates but delight brain scientists. For example, female mice whose
genes for that receptor is knocked out attack males when they should be receptive to them, and fail to show lordosis when their flanks are stimulated, even after estrogen injections. Because androgens are converted to estrogens in many cells in the male brain, the estrogen–receptor knock-out male is also sexually deficient, although less so. In the normal mouse the estrogen receptor binds the hormone in the nucleus of a neuron, and the combined complex binds to certain genes. Many consequences follow. For example, in the ventro-medical hypothalamus of the female rat, the genes for oxytocin and its receptor are stimulated to produce more of both, giving estrogen a powerful multiplier effect on oxytocin’s functions. Injecting antisense DNA into the hypothalamus which blocks the messenger RNA for the oxytocin receptor and thus prevents its synthesis, reduces lordosis. Estrogen also turns on the genes for encephalin, the brain’s own morphine and one of its receptors in the hypothalamus, suggesting an impact on the capacity for pleasure. As Pfaff has aptly said, sex has now been shown to involve a ‘symphony’ of genes and transcription factors, and the circuits involved can now be understood electrically, neurochemically, hormonally, and genomically.

But for all the importance of these hypothalamic circuits and hormones, many lesions there do not abolish interest in the opposite sex, which may remain avid despite all lack of ability. This means that even for rats, higher limbic and cortical centers in the brain store more complex thoughts, emotions and memories that motivate closeness even when sex itself is impossible. This is all the more true of the human animal … “

With rats being determined by their genes in a much more simple way than humans it is difficult to imagine how all these factors are to be controlled by a geneticist.

In addition, sexuality does not only depend on static predispositions, but there are numerous situational factors that can play a strong role. As we humans all know, those factors can be very sophisticated. But they can be also very banal - food, for example can play a role in how much lust a person is seeking as Konner describes (Konner, 2002, page 283):

„Eat enough eggs, which contain choline, and the amount of acetylcholine in brain synapses rises; eat enough cereal, which contains tyrosine, and you increase brain dopamine, made from tyrosine. Eating a large non-cereal carbohydrate meal increases the brain’s level of amino acid tyrophan, by shifting the balance of amino acid competition at the blood-brain barrier. In-
creasing tyrophan increases serotonin, the neurotransmitter made from it. Since serotonin inhibits sex in lab animals this findings lends credence to some old kitchen folklore: If you want a man to perform, don’t fill him up with a port of starch. But this may only be because serotonin induces sleep.”

Better known to the general public are the situational factors influencing the joy that we have with sexual activity because those factors have been discussed and made a topic in thousands of pieces of (fiction and non-fiction) literature and because they can be experienced easily by observing one’s own sex life in an analytical and honest way. Here again, it is Konner who describes the complexity of this system in a very clear and plausible way (Konner, 2002, page 260): „Whenever two creatures meet for any reason, there is and should be fear. In courtship, risks include rape and other physical trauma, infectious disease, unwanted pregnancy, the humiliation of unrequited love, loss of status, seduction and desertion with the attendant pain and grief, and making the most colossal mistake of your life – entangling your destiny with the wrong person. Viewed as a system, the intricacies become unmanageable. (Genetic) Engineers can feel superior if they like, but they have never attempted anything remotely this complex. Multiple moods and wants are regulated, uncertain goals are approached, and many fears are modulated and minimized (or at least balanced against the fear of loneliness)”

In brief: The field of sexuality is probably not one of the obvious fields to start with as a GEHB engineer.

2.3.5. Case Study (3): Dopamine and Serotonin

One might ask now „So what if genetic engineers are not able to give a guarantee for their service delivering the desired effects at all times and in each individual case?” Sports car manufacturers don’t guarantee that buyers of their product will be able to drive fast and safely in congested cities, but that still doesn’t make the product unattractive. Why shouldn’t we be happy with genetic engineers enhancing a certain predisposition, leaving us to do the rest of the job but with a greater probability of being successful? In the case of enhancing our predisposition for better moods, couldn’t that very easily be done by enhancing an individual’s biological capability to produce and absorb certain neurotransmitters and to avoid others?
A very educative introduction to the world of neurotransmitters and their various functions is provided by Melvin Konner’s book *The Tangled Wing* (2002) or by Stefan Klein’s bestselling popular science book *Die Glücksformel* (The Formula for Happiness) also published in 2002. Klein explains that there is a large variety of chemicals, called neurotransmitters that are present in our brain at all points in time. Depending on the exact ingredients mix of this cocktail, they cause us to feel one way or another. Very much in the way that a symphony orchestra produces different sounds depending on which instruments are played and how, the ever-changing cocktail of neurotransmitters causes a large variety of finely tuned mixes of moods inside of our brain.

Two of the best researched neurotransmitters are dopamine and serotonin. This makes them a good example for further explanations on the potential as well as the difficulties of genetic enhancement.

**Dopamine**

One of the instruments in the orchestra of neurotransmitters is dopamine. For a long time it was believed that dopamine was a “happy maker,” thus we would probably all have spontaneously regarded it as an obvious target candidate for enhancement. Dopamine is present in drugs like nicotine and cocaine and is present in the brain of rats after they have eaten chocolate or had sex, so the correlation seemed obvious.

Research in 1996 about the correlation between the number of dopamine receptors in the brain and personality traits as found in psychological tests showed, however, that people with a genetic predisposition for having more dopamine receptors in their brain also scored high in psychological tests measuring how extroverted a person is. While this was first interpreted as being further proof for the happy-maker effect of dopamine, newer research showed that things are not quite that easy. In an experiment at the University of Michigan in Ann Arbor, researchers found that rats still showed all signs of pleasure when eating chocolate even when all dopamine producing cells had been eliminated with a neurotoxin. The explanation found was that rather than being the reward for a pleasure-creating activity, dopamine was the *motivator* for seeking such pleasure-giving things. For feeling pleasure other neurotransmitters and in other regions of the brain were found to be responsible, in particular opiates, endorphins, and encephalin. Dopamine, therefore, is more a chemical that causes motivation and maybe even a form of “dissatisfaction” if the perceived desire is not ful-
filled, rather than creating a feeling of calmness and satisfaction from saturation. This would also correlate with the well known fact that a cocaine or nicotine addict constantly has to increase the doses of dopamine intake to reach the same feeling of satisfaction without ever really reaching this state of calmness and saturated happiness that one would expect from a „happy drug.”

This example also shows impressively what kind of huge errors that could happen if GEHB technologies existed and were used prematurely, i.e., on the basis of insufficient knowledge of the effects. It is hard to imagine the massive individual disappointments, the political consequences, the liability charges against genetic engineers and researchers, and the guilt feelings of parents that could all be the result of many thousands of humans having been „enhanced” to become super-nervous, never-resting, ultra novelty-seeking dopamine junkies and were condemned to be so for as long as they live.

**Serotonin**

Given these observations, one will probably consider the next example concerning the reduction of a neurotransmitter that is a potential depression-producer for genetic enhancement somewhat more cautiously:

It has been shown in extensive psychological studies that a certain genetic variant and a tendency to neuroticism show a strong correlation. The genetic variant is called „Lesch gene” named after its discoverer Prof. Klaus-Peter Lesch. It is responsible for the production of a protein called 5NHTT whose function is to pump back serotonin into the synaptic membrane of the neuron where it came from, thereby increasing the intensity of serotonin in this cell. The gene exists in at least two different versions on chromosome 17 whereby one of the versions is 44 base elements longer than the other one. Persons who carry the longer version show in tests a significantly higher tendency to neuroticism, i.e., to be emotionally instable, fearful, moody and to have a lack of self-confidence. It could also be shown that the longer gene version creates more efficient re-transporters and, thus, is responsible for a lower concentration of serotonin in the synaptic crack, which in turn seems to be the reason for the more frequent occurrence of bad moods for carriers of the gene. The correlations between a low serotonin concentration at the synapses and bad moods was already proclaimed as a theory 30 years ago by researchers in North Carolina who claimed that the low concentration of serotonin led to the exhaustion of another neurotrans-
mitter, noradrenalin, which is one of the well known causes for pathological depressions (see Nemeroff, 2002, page 85).

But here again, before demanding the elimination of depressions and the boost of self-esteem by genetic engineering, one should consider the potential consequences for the enhanced persons very thoroughly.

The natural and evolutionary function of moods is to motivate higher developed living creatures in one way or another to perform functions that are relevant for the survival and for reproduction. Seen this way, bad moods are not always bad for a living creature in general; they are necessary motivators to ensure survival.

For example, if we did not feel unhappy about being too cold, too hungry, too fat, too stupid, too oafish or whatever other problem or weakness there might be, if we did not feel the urge to change something simply because it did not give us any unpleasant feeling, then we might not change anything and freeze or starve to death, stay dirty, unfit or alone out of lethargy. In case we are emotionally ignorant of being too stupid or oafish, our survival might not be endangered as long as we are still able to earn our living and find a patient mate. But when it comes to being immune against signals of bodily needs like being too cold or too hot, even our very survival might be in question.

In summary it is probably fair to say that with the current level of knowledge about the complex functions of the brain, it is hard to imagine that even a very forward oriented genetic engineer in the Western world would not hesitate to take the risk of tinkering around with a system as complex and as unknown like the neurotransmitter balance within the human brain just to fulfill some enhancement wish of eager parents.

Only when the risks of doing nothing clearly outweigh the risks of intervening, as is the case with epilepsy patients, might genetic enhancement replace what is being done with strong psychotropic drugs in the foreseeable future.

**Psychotropic Drugs**

While genetic modifications may cause unstoppable damage because they produce unchangeable preconditions once carried out in a living creature, psychotropic drugs are risky but be stopped as soon as any problems occur. This advantage makes psychotropic drugs somewhat more acceptable and more usable. The use of psychotropic drugs therefore make them a model
showcase for the kind of ethical and practical problems that can arise when many people manipulate their own brain or that of their children.

Psychotropic or psychoactive drugs unfold their function primarily by manipulating the neurotransmitter mix in the brain by boosting or blocking a certain kind of neurotransmitter. A large number of highly effective psychotropic drugs that have allegedly no undesired side effects if taken as prescribed have come on the market in the last few years.

On of them is Prozac, an antidepressant drug that is a “… so-called selective serotonin reuptake inhibitor (SSRI), which, as the name implies, blocks the re-absorption of serotonin by the nerve synapses and effectively increases the levels of serotonin in the brain. … Today, Prozac and its relatives have been taken by some 28 million Americans, 10% of the population…” (Fukuyama, 2002, page 43). Contrary to its general wonder drug image of supposedly having no negative side effects, there are in fact some reports about weight gain, memory loss and sexual dysfunction which are, however, probably difficult to prove at this point (see also Fukuyama, 2002, page 44).

Another currently well-discussed drug is Ritalin, used primarily to treat ADHS (attention deficit hyperactivity syndrome), a diagnosis shared by some 5-10% of the boys and 1-4% of the girls in North America and Western Europe. This disease is caused by a genetic variant of the genes that regulate the dopamine flow. Ritalin corrects the resulting neurotransmitter mix by mainly increasing dopamine production. Ritalin causes the patient to concentrate better. This is why it is also taken illegally by some 4% of college students in the U.S. as a study found in 2001 (see Schleim, 2005, page 48).

Another example of a common and widespread psychotropic drug is Modafinil. This drug was given to U.S. soldiers during the Iraq war to enable them to stay awake for 48 hours or more without being tired. Modafinil is actually used to treat narcolepsy, a disease that makes the carrier fall asleep against his will immediately, but it does not have the side effects of other drugs that ward off fatigue like AMPH (a type of amphetamine) which was already given to the soldiers in World War I and II. The same drugs that soldiers take today might become common practice at the workplace once there are pills on the market that enhance productivity with no side effects. Most likely workers in a liberal society could not be directly “forced” to take the pills in any way, but those taking them would set the work-place standards and thus create an indirect pressure for everybody else to do likewise.
The same might become true for other areas where a market for enhancing can be assumed, like learning, loving or the hedonistic pleasures of experiencing new things, enjoying music or food, etc.

In a broader sense, psychotropic drugs are already omnipresent in our daily life now. Nicotine, for example, or its much stronger and illegal dopamine-brother cocaine. Alcohol is a substance that has been around ever since humans discovered fermented fruit, which could have been as early as tens of thousands of year ago. Alcohol is a relatively dangerous drug but is culturally accepted to such an extent that attempts to prohibit it in the United States of the 1920s became a policy disaster. Alcohol has a simultaneous narcotic and euphoric effect that probably most humans have experienced at some time in their lives. It is definitely a psychotropic drug, but since alcohol causes long term health damage in many countries, most people might not agree that it is an enhancer.

There are a number of other, very common psychotropic drugs that are either used for psychiatric treatment, like antidepressants for the treatment of chronically depressed patients, or that are accessible to the general public, like tranquilizers and sleeping pills. All of these drugs are intended to treat a medical problem, but the delineation between a medical problem and the desire for enhancement of some sort is not always easy. Take Viagra as an example, a drug that targets the neurotransmitter sulfur monoxide and is taken by many men that would have accepted their age-related fate of decreased sexual capability before this drug was introduced in 1998. There are numerous psychotropic drugs that claim to be able to influence brain functions such as to reduce appetite, to stop smoking, etc., without the patient having to muster up the will power to stop this activity on his own. The market for „lifestyle drugs” and „mind-doping” drugs has become huge and there are many more of them in the research & development pipelines of the pharmaceutical industry. Stephan Schleim (2005, page 46) reports that the market for these drugs was some U.S.$ 20 billion in 2002 and is expected to have a size of U.S.$ 29 billion in 2007.

Drugs typically have side effects and with psycho-pharmaceuticals the problem of side effects was especially undesirable for a long time. The tiredness after a night of sleep after having taken a sleeping pill, the risk of addiction and the need for ever-increasing doses were all reasons that psycho-pharmaceuticals did not have the potential to become a mass phenomenon acceptable by the morality and the laws of a society. Traditional
psycho-pharmaceuticals had little potential to become widespread enhan-
cers.

If this classical weakness of traditional psychotropic drugs could be elimi-
nated and modern pharmaceutical science could assure the production of
psychotropic drugs that do not have any long-term side effects, then those
modern psychotropic drugs might become the enhancement method that
would predate a widespread use of GEHB by far. But if modern psychotro-
pic drugs turn out to also have serious unwanted side effects, then we
should remember Gregory Stock’s prediction that the research in connection
with them might only be one of the contributing factors towards the devel-
opment of GEHB capabilities after all.

2.3.6. Conclusions

People who believe that GEHB can become potentially feasible, at a mini-
mum implicitly believe in the three paradigms of GEHB technology:

1) They believe that the human traits that are the targets for enhancement
   interventions are to a relevant extent determined by identifiable, physical
   structures of the brain

2) They believe that these identifiable structures are to a relevant extent de-
   termined by genes.

3) They believe that humans will be able to manage the modification of the
   genes that produce these brain structures in a targeted and well con-
   trolled way.

It depends to a great extent on what kind of enhancement one is talking
about whether there is scientific evidence supporting these paradigms or
not. The U.S. brain researcher Antonio Damasio and the British brain re-
searcher Adam Zeman (see bibliography) both have described with a lot of
sensitivity the state of the art in scientific research concerning this question.
They both come to the conclusion that most likely the two first paradigms of
GEHB are true. Modern brain research more and more supports the „physi-
calist“ view that the soul, the personality, emotions, etc., are exclusively
functions of biochemical and biophysical structures and events within the
brain. It finds virtually no evidence for the „dualist“ view which says that
the soul has nothing to do with the physical existence of the brain and has
an existence of its own. Damasio points out that Descartes was most likely wrong by concluding „cogito ergo sum“(I think, therefore I am) because empirical evidence of modern brain research all points to the fact that the right conclusion would have been „sum ergo cogito“(I am, therefore I think).

But almost all publications of this quality also point very explicitly to the fact that the complexity of the matter and the scant knowledge that we have about the human brain thus far does not really allow for anything more than qualified guesses.

The 1990s were declared the „decade of the brain“ and brought a flood of publications that also made it into the general media. This flood of information gave the general public an impression that swift progress is being made on our understanding of the human brain. But there was a lot of exaggeration built in as well. Obviously, there is no such thing as an „intelligence gene“ or a „happiness gene“ or an „anger gene“ as the over-simplifying yellow press sometimes makes their readers believe. The relationship between genes and personality traits is much more indirect and complicated than that. Genes and learning experiences equally determine the physical structure of the brain of a person in a very multifaceted and interrelated way.

4) In brief, there is no serious way of assuming that we will be able to gain complete understanding of all the structures and the electrical and chemical processes in our brain in the near future such that we can design it in a purposeful and well targeted way. At the moment, at least, we are far away from fulfilling the third paradigm above which assumes our ability to manage the modification of genes in a targeted and well controlled way.

For GEHB technologies to be developed within the next few decades, it would thus be necessary to find other approaches. For example, one could just observe the correlations between traits and genes to reach a basis for the first clinical tests of germ line modifications just as the Wright brothers learned more by trial and error on how to build an airplane, instead of researching all the aerodynamics and physics involved.

The fact that people have a „physicalist“ view of the human mind opens the door to the belief that GEHB might become technically feasible one day. But this does of course not automatically mean that they also believe it should be done and that it is not risky to try it.
This brings the safety questions into the focus of the discussion about GEHB.

2.4. Safety Concerns and the Technology Readiness Level of GEHB

2.4.1. General Consensus on the Importance of Safety

In almost all the non-fiction publications on genetic enhancement, the safety of this technology is an issue that is mentioned in one way or another. All the authors agree in principal that use of the technology without sufficient technology safety is ethically unacceptable. I did not find any publication that promoted the radical view that experimentation with humans is fully acceptable even when the outcome is completely unknown. Those publications might exist beyond the mainstream, but those views are so unconventional in many ways that we will ignore them here.

But underneath the thin layer of what seems to be a general consensus, there are thick layers of disagreement on what degree of certainty should be mandatory for allowing a first time application of GEHB-techniques on human embryos, sperm cells or egg cells.

The possibility for error is very great in germline modifications. A working group at the Johns Hopkins University led by Susannah Baruch points out the main concerns in its 2005 report „Human Germ-Line Genetic Modification – Issues and Options for Policymakers“ (page 21 of this report):

- „If a gene fails to be inserted into the genome or if it becomes inserted but fails to function, the resulting child likely would be no worse off than he or she would have been without the attempted genetic modification.” (However, this would probably be considered a case of default intervention with ensuing liability problems just as when it turns out after a surgical operation that the surgeon has failed to remove an ulcer.)

- „... if an introduced gene malfunctions or if too many copies are introduced, serious health consequences could result. ...”

- „Likewise, the insertion of a gene into a wrong region of the genome can lead to insertional mutagenesis, where the gene insertion causes a muta-
tion in an otherwise normally functioning gene” For example: „Human somatic gene therapy clinical trials’ to correct the ‘bubble boy’ disease ... resulted in three patients developing leukemia as a direct result of insertional mutagenesis …”

• „Some potential (germline engineering) techniques also could put parents at risk. ... Injecting viral vectors into tests to genetically modify sperm in animals has resulted in male infertility. A similar outcome could occur in females as well. …“

• „The safety of germline genetic enhancement is further complicated by the fact that some problems might not be evident until well after the genetically modified child is born or reaches adulthood when the problems already could have been passed on to the next generation.” And: „Some observers believe multigenerational data from animals will be needed before human trials can begin. Given that, it may take sixty to eighty years to obtain multigenerational data from some animal species, but questions exist about whether animal data would ever be sufficient to warrant human clinical testing at all.”

• But on the other hand this is also true: „Introducing a gene into an embryo does not guarantee that that gene will be passed on and function in future generations.”

The conclusions derived from this risk situation vary considerably. Benchmarks for what is an acceptable risk level depend mainly on what benefits one expects from this technology. The Baruch report remains as inconclusive in this respect as all the other publications on the subject that try to be scientifically objective and neutral:

• „Some say the new technology must be shown to be no more risky than the normal process of conception and birth” - what this means exactly remains unexplained, though. And:

• „... the relevant question is whether the person born after the use of reproductive technology is better off than if he or she had never been born. This view is based on the assumption that existence is in most if not all cases preferable to non-existence.”

• However, in case an already existing embryo is modified, „... others say that ... the alternative for these children is not non-existence but rather continued existence in an unmodified state.”
This Baruch report concludes that „Given current safety concerns it remains unclear whether human germline genetic modification ever will be, or even should be, developed.”

It should be added that this report - like so many other scientific publications on the subject - assumes that genetic enhancement will be mainly used as an extension of traditional medical treatments to eliminate a medical „problem” rather than a pure „upgrade” modification to enhance otherwise „normal” human beings. This would bring the risk-benefit analysis into the realm of traditional biomedical ethics and would make the standards that have been developed there fully applicable. This in turn would mean that it would have to be determined what is an acceptable risk level to go ahead and to have an initial trial carried out by the responsible regulatory agencies of the government.

### 2.4.2. The Viewpoint of the FDA in the United States

In a letter written in 2001 to biomedical researchers, the Food and Drug Administration (FDA) of the U.S. government made it clear that it will regulate all research in humans involving „the transfer of genetic material by means other than the union of gamete nuclei,” which would clearly include germ line engineering. This means that researchers would have to submit an investigational new drug (IND) () application and show that there is sufficient preclinical data to justify a trial in humans (see Baruch, 2005, page 41). According to Baruch, in 2005 the FDA reviewed approximately 210 IND applications for somatic cell gene therapies, but it is unknown whether it has already received an IND application for germline engineering.

If the FDA approved any such application, this would have major implications on the regulatory practices in many other countries. According to literature about the market for biotech stocks (see Wagner, 2000, pp. 73-74), the FDA is quasi a „benchmark provider” for the approval of pharmaceutical products and innovative medical procedures. This is partly due to the market size but it is also due to the very rigid liability laws of the United States. Mistakes in the approval procedure could turn into a major economic disaster if medical malpractice lawsuits determined that the FDA is to blame.
In the case of new pharmaceutical drugs the selection and testing procedures can take up to ten years. This usually entails a cost of several hundred million U.S.$ up until the time when permission to sell is given. Only one of ten substances developed in the labs of the pharmaceutical industry is even approved for clinical testing. Following approval, there is phase (I) of clinical testing with some 10 to 100 volunteers. Usually more than 50% of all drugs are not approved for phase (II), during which some 50 to 200 patients are tested. In phase (III), usually with some 2,000 patients, the long term evaluation is in the foreground. There are a few hundred drugs in the pharmaceutical industry pipeline at any given point in time. This is to assure the long term survival of pharmaceutical companies which only works out if there is an occasional „blockbuster” drug, i.e., that generates revenues of a few billion U.S.$ per year.

In addition to this vigorous and therefore expensive scrutiny, the pharmaceutical industry is saddled with many other with high costs. These include product liability insurance, highly trained sales staff, medical doctors, laboratory technicians, etc. This is all part of the system of product safety that has become standard for Western societies and will also be required for any medical technologies of the future.

Now let us transfer this to the area of GEHB. We will quickly see that there is a long way to go, even if nobody saw any ethical problem at all concerning the application of the technologies.

Let us suppose, for example, a hospital somewhere in the United States would like to try curing Huntington’s disease by performing a germline intervention in an individual case. If the FDA investigators did their job properly to secure the safety of the service that the hospital wants to offer, then they could allow the intervention to be performed but would have to insist on a long term observation of the effects. How many years that would mean after the modified fertilized egg has been born as a human baby is uncertain. However, to get solid data at all, the person probably would at least have to grow up to adulthood and perhaps a little longer than that, say the first 25 years of the life time of the „enhanced” person. Needless to say that a few decades of delay between inventing and selling a product on a large scale is hardly a good precondition for motivating profit driven companies to invest heavily in R & D.
2.4.3. What is the Technology Readiness Level of GEHB?

In order to be marketable, a product or service not only has to assure a sufficient safety level, it also has to be superior to other products or services that offer the same benefit in some way. For example, cross-Atlantic air travel was only marketable as a mass product after passenger planes had reached a sufficient safety level. It had taken a while after the first flight of Charles Lindbergh, but once it had reached that level this kind of crossing the Atlantic from Europe quickly replaced traveling by ship because of its superior speed. With air travel becoming more and more popular, the economies of scale made the price of this technology superior to ocean liners as well and today even a few plane crashes per year cannot reverse the total dominance of air versus boat travel.

In all highly industrialized countries there are government authorities to assure that safety levels of new products or services are sufficient before they are released and can be sold on the market. For example, a systematic approach for checking this level of safety for air travel is used by the U.S. Department of Defense, NASA and by the U.S. Federal Aviation Administration by defining the different levels of "technology readiness" in the following way (next page):

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<tr>
<td><strong>Technology Readiness Level</strong></td>
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<td>---------------------------------</td>
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<tr>
<td>1. Basic principles observed and reported</td>
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<td>2. Technology concept and/or application formulated</td>
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| Technology Readiness Levels in the National Aeronautics and Space Administration (NASA)  
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<tr>
<td>3. Analytical and experimental critical function and/or characteristic proof of concept</td>
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<td>At this step in the maturation process, active research and development (R&amp;D) is initiated. This must include both analytical studies to set the technology into an appropriate context and laboratory-based studies to physically validate that the analytical predictions are correct. These studies and experiments should constitute &quot;proof-of-concept&quot; validation of the applications/concepts formulated at TRL 2.</td>
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<td>4. Component and/or breadboard validation in laboratory environment</td>
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<td>Following successful &quot;proof-of-concept&quot; work, basic technological elements must be integrated to establish that the &quot;pieces&quot; will work together to achieve concept-enabling levels of performance for a component and/or breadboard. This validation must be devised to support the concept that was formulated earlier, and should also be consistent with the requirements of potential system applications. The validation is relatively &quot;low-fidelity&quot; compared to the eventual system: it could be composed of ad hoc discrete components in a laboratory.</td>
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<tr>
<td>5. Component and/or breadboard validation in relevant environment</td>
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<tr>
<td>At this level, the fidelity of the component and/or breadboard being tested has to increase significantly. The basic technological elements must be integrated with reasonably realistic supporting elements so that the total applications (component-level, sub-system level, or system-level) can be tested in a 'simulated' or somewhat realistic environment.</td>
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<tr>
<td>6. System/subsystem model or prototype demonstration in a relevant environment (ground or space)</td>
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<td>A major step in the level of fidelity of the technology demonstration follows the completion of TRL 5. At TRL 6, a representative model or prototype system which would go well beyond ad hoc, 'patchcord' or discrete component level bread boarding - would be tested in a relevant environment. At this level, if the only 'relevant environment' is the environment of space, and then the model/prototype must be demonstrated in space.</td>
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| Technology Readiness Levels in the National Aeronautics and Space Ad- 
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<th>ministration (NASA)</th>
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<tr>
<td>7. System prototype demonstration in a</td>
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<td>space environment</td>
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<tr>
<td>8. Actual system completed and 'flight qualified' through test and demonstration (ground or space)</td>
</tr>
<tr>
<td>9. Actual system 'flight proven' through successful mission operations</td>
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As we learned from the chapters above, GEHB is not really a technology itself but rather the headline for a whole category of potential applications of the same basic techniques. Each application has to cope with its own research, experimentation and safety considerations. Should an application for permission to use an GEHB intervention ever be handed in to a government authority, then most likely only this one form of application would be scrutinized. All other applications would have to be checked individually, just as there is no blanket permission for pharmaceutical drugs of all kinds, but rather an approval process for each individual drug.

No conceivable GEHB application has even reached level (1) of this list of technology readiness levels. Given this situation, there are a number of authors who point to modern psychotropic drugs as a more viable alternative to GEHB. But paradoxically, the existence of psychotropic drugs is not only the strongest argument against GEHB ever materializing; at the same time it
also the strongest argument in favor of the technological feasibility of GEHB.

2.4.4. Psychotropic Drugs as the Easier-to-Achieve Alternative?

The history of technology is full of examples where seemingly good inventions have a very short life span on the market simply because they were overtaken by even better inventions. Fax machines, for example came on the market only in the mid 1980s. Since the advent of the Internet and e-mail technology, they will probably have disappeared completely by 2015. The portable CD player never really made it on the market at all because the MP3 player came shortly afterwards and offered a superior technological solution.

Could GEHB be such a technology that will never make it on the markets even though it is much discussed now? Will it be surpassed by superior alternatives?

Many scientific authors suspect this and those who do all point to the existence of more and more sophisticated and high-quality psychotropic drugs. Good modern psychotropic drugs, they say, might be able to achieve the same as GEHB but have a few more advantageous features. These features could give them the decisive competitive edge to conquer the markets before GEHB even becomes a seriously considered topic for the business strategists of the biotech industry. Many of the advantages were already discussed above as well:

- Psychotropic drugs do not result in any „hardwiring” of the brain. If their effects become undesirable at any point in time, the user can just stop taking them. There remains, of course, the danger of addictions, but this is still a more manageable problem then a change in the genetic determination of the physical structures of the brain.

- Psychotropic drugs do not have any inheritable effects, so the parents have lesser burdens of decision-making.

- There is already a standard procedure in place for obtaining market approval for those drugs. Therefore and there is already a general accep-
tance by the public of a certain failure rate that will inevitably occur in all
technologies.

- Psychotropic drugs are a familiar technology not only for the regulatory
  bodies of this world, but also for the general public, the media, for ethi-
cists, etc. They are an extension of pain relievers, tranquilizers, antihis-
tamines, contraceptives, etc. that have been around for some fifty years
now and have long been accepted by society.

So maybe there will only be a few exotic applications left for GEHB tech-
nologies that cannot be influenced by taking drugs that easily. Maybe only
the Huntington cases and other clearly determinable genetic defects will at
some point in the future be the typical cases for GEHB, while the more con-
troversial areas of enhancing the human brain, such as cognitive power,
moods and social behavior, will be manipulated by psychotropic drugs.

Professor Paul Root Wolpe, a neuro-ethics expert at the Centre for Bioethics
of the University of Philadelphia, is one of the proponents of this technology
forecast theory. In a conversation that I had with him in June of 2005, he de-
defended his theory using as support the non-genetic enhancements of the
human body that have come into use during the last few centuries. Take
shoes, for example. Even though wearing shoes has definitely nothing to do
with genetic enhancement, the fact that most human beings nowadays do
wear shoes makes it kind of a non-genetic enhancement. And shoes are a
technology that is so cheap, so efficient, and so old that offering to geneti-
cally enhance the thickness of skin on the soles humans’ feet sole would
surely be regarded as a ridiculous enterprise. Besides, this thick skin would
have to be “worn” even when it is not wanted – when your spouse offers
you a foot massage, for example. The same could be said for eyeglasses
(which might be increasingly replaced by laser operations), hearing aids,
helmets, tooth fillings, etc,. all of these things have become omnipresent
parts of our daily life without us worrying about it too much. Wolpe claims
that modern psychotropic drugs have that same potential of becoming an
omnipresent, generally accepted non-genetic enhancement technology as
they grow more and more efficient and lose more and more of their unde-
sirable side effects.

So if Wolpe and others are correct, is it not premature to invest time and en-
ergy thinking about the ethical aspects of GEHB? Would it not make more
sense – to put in it in the words of Gregory Stock (Stock, 2003, page 207) -
to“… deal with actual rather than imagined problems …”? 
2.4.5. Does it Make any Sense to Think about GEHB at this Stage at all?

I would like to argue that it does make sense, for two reasons:

*First, the history of technological development is full of surprises.*

It is not certain at all that psychotropic drugs, brain implants or the like can really deliver what they seem to promise in projections and forecasts today. For example, there are many scientists who have great doubts about the assumption that it is even possible to produce drugs that do not have any undesirable side effects at all (see for example Henrik Walter in „Geist & Gehirn“ 12/2005 page 49).

At the same time, their might be GEHB applications that become a surprising success story with widespread public acceptance. How many times in the past have technology forecasts failed miserably because they had underestimated the speed of some technological development or because the forecasters had not taken into account the cross-fertilization from technological progress in other fields that caused leaps forward, or because forecasters had assessed the demand wrongly? Just think about the success story of the automobile that was assessed so wrongly when the first loud, foul-smelling, fragile cars appeared on the road.

Here is another example: When Jules Verne wrote his story about traveling to the moon his novel was considered ridiculous and quite far fetched. Only 104 years later it actually happened, because the Cold War inspired the Kennedy administration to give it utmost priority. And coming back to air travel as an example: Who would have thought only 50 years ago that an airport handling 100,000 air passengers per day would be considered medium sized in the world of 2005? Given all those underestimations of the past - maybe the likelihood of GEHB-technologies coming into existence is not as minimal as it seems at first sight for us today.

*Secondly, in such an important issue as GEHB it absolutely does make sense to have a plan for decision-making in place.*

Even for eventualities that are not so likely to become reality anytime soon, we have all kinds of contingency plans. Armies have defense plans for the case of an attack even though they do not immediately expect one; fire brigades prepare for the large scale fire that may never happen; corporations
usually have several scenario plans in their top management drawers in which they determine their actions for when markets change, even though only one of those several scenarios can become reality, etc. Doesn’t it make sense to prepare for a well managed public and democratic discussion on the ethics of a “mega-issue” like changing our personalities and minds through GEHB even though the feasibility of the necessary technologies is not assured? Besides, this book’s intention is to provide insights into what is and not what should be. It is a work of descriptive ethics and not of normative ethics. The insights presented here concern the assessments of GEHB as they are now, a snapshot of the current status of the ethical discussion so to speak. And currently we cannot regard the issue of GEHB as “dead” and as a non-issue at all. Besides, many of the ethical positions portrayed in later chapters of this book are most likely also valid for the related and neighboring field of neuro-ethics and its focus on psychotropic drugs.

**Thirdly, the ethical discussion on GEHB is a highly sophisticated and deep discussion on human conditions and the meaning of life in general.**

If we are able to change our personalities, then the value of unchanged personalities all of a sudden becomes a very sophisticated new question again. The profound and complicated questions of what human beings should be like, what our societies should look like and what the final purpose of all of our existence is come up in a surprising new shape when discussing the ethical desirability of GEHB. For example: If you think that happiness is the most important meaning of life then what do you think about creating a perfectly happy slave? Or maybe you do have other values that come into play without your having been aware of them so far? Aldous Huxley would probably be amazed that we are still actively discussing the basic theme of his novel *Brave New World*.

I think the profoundness of the issue alone makes the discussion of the ethics of GEHB worthwhile.
2.5. Market Forces

2.5.1. The Importance of Market Forces

Market Forces are important because they drive Technological Developments

In a world that is dominated by free market economies, market forces, specifically private demand, plays a crucial role for the development of any technology. Not the only role as the following graphic shows, but a very important one since it generates revenues for the companies that produce new technologies. In particular in democratic political structures private sector demand also determines government spending and government regulations in an indirect way to a great extent:

Markets do not exist unless the „product“ or „service“ is accepted by the general public. They cannot really flourish unless the product or service is ac-
cepted by the legal system. Markets influence public opinion by advertising, but also just by the presence of the product or service per se.

*Public opinion* depends on a lot of determining factors like the basic philosophical concepts that are part of the culture but also on more short term aspects. Most people do not have the time and educational background to analyze every aspect of our complicated life themselves. Instead, they rely heavily on what they see and hear in the media, or on the opinions of „experts“ and respected personalities of all kinds. Then there is of course public relations and advertising constantly showering all of us with a never-ending stream of impressions.

*Public policies* in democratic countries are very much dependent on public opinion, but public opinion is also influenced by public policies („what is authorized by the government cannot be so bad“).

The *scientific progress* that is required for developing a certain technology depends on *inherent challenges and opportunities*. How difficult is the task, how much do we already know, what kind of research technologies are available, what approach is the most efficient one, how much talented staff is working on the problem, ...?

But *scientific advancement* of course also depends on the *resources* put into a certain development effort. This could be a market driven development (e.g. the computer industry, consumer electronics, etc.) or a policy driven – development (military requirements, the necessity to develop alternatives to fossil fuels, etc.)

**Market Forces are Important because they Drive Ethical Thinking of Libertarians**

„When there is a demand for something – are we really ethically allowed to ignore that?“

„Are we really allowed to prohibit the consumption of a specific product or service? What do we accept as criteria to declare one kind of demand legitimate and another kind illegitimate?“

These are really ancient questions of free market proponents and this is surely not the place to go into discussing them in their ethical justification.

It would, on the other hand, be short-sighted and narrow minded to not recognize this connection between the world of economics and the world of ethics in a field like GEHB. We will come back to this important link in a
later section of this book where the political questions surrounding GEHB will be the main issue.

2.5.2. Therapy or Enhancement?

Before going into the details on what different authors wrote about the market potentials, one issue has to be pointed out that plays a role in all of these reports: the fact that there is great uncertainty whether GEHB in particular and germline engineering in general falls into the category of health and therapy technologies or not.

As already mentioned above, many of the scientific authors treat germline engineering as an extension of the traditional methods of medical treatment. It almost seems that there is a fear of getting onto a slippery slope in an ethical way when detecting a demand for pure genetic enhancement without having any medical necessities as a solid basis to operate on.

One of the publications of this kind is the Baruch report that was already quoted in the last chapter. It makes the following definition-like statement about consumer demand (Baruch, 2005, page 24):

„Consumer demand considers whether alternative treatments are available, the number of people affected by the disease or condition, and whether the targeted genetic characteristic likely is to be viewed as a serious disease or as a more ethically problematic enhancement.“

Starting from that base, the report makes the following assumptions about the potential demand for germline engineering:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Examples</th>
<th>Technical Feasibility</th>
<th>Consumer Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention of mitochondrial disease</td>
<td>Transfer donor ooplasm in order to provide unaffected mitochondria and mtDNA</td>
<td>Most feasible ooplasm transfer and pronuclear transfer have been performed in humans</td>
<td>Less demand Mitochondrial disease is extremely rare</td>
</tr>
<tr>
<td>Scenario</td>
<td>Examples</td>
<td>Technical Feasibility</td>
<td>Consumer Demand</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
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<td>-----------------</td>
</tr>
</tbody>
</table>
| Genetic vaccine | Confer genetic resistance to HIV infection (e.g. CCR5) | Moderately feasible  
Some genes have been identified; feasibility is dependent on efficient genetic modification techniques. | Moderate demand  
Non-genetic modification alternatives more likely |
| Prevention of recessive disease with two affected parents | Prevent cystic fibrosis in child of two affected parents | Moderately feasible  
Genes have been identified; feasibility is dependent on efficient genetic modification techniques. | Less demand  
Extremely rare cases. Adoption, donor gametes of embryos are alternatives. |
| Prevention of late onset dominant disease with homozygous parent | One parent has two copies of BRCA1 mutation | Moderately feasible  
Genes have been identified; feasibility is dependent on efficient genetic modification techniques. | Less demand  
Cases are extremely rare; Homozygosity of many dominant disease-related gene mutation often has severe effects that preclude survival to reproductive age |
| Prevention of recessive disease | Prevent sickle cell disease, cystic fibrosis, thalassemia in children of two | Moderately feasible  
Genes have been identified; feasibility is depend- | Less demand  
PDG is an effective alternative |
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Examples</th>
<th>Technical Feasibility</th>
<th>Consumer Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhancement of physical characteristics, mental capacity or behavior</td>
<td>Change or add gene to influence height, improve memory, intelligence, creativity or confidence</td>
<td>Less feasible Genetic contributors to these characteristics are unclear</td>
<td>Uncertain demand Ethical objections to enhancements</td>
</tr>
<tr>
<td>Multiple genetic modifications</td>
<td>Add immunity, athletic skill, etc.</td>
<td>Least feasible Genetic contributors are currently only imagined</td>
<td>Uncertain demand Ethical objections to multiple enhancements may be particularly high</td>
</tr>
<tr>
<td>Extensive changes</td>
<td>Add armored skin, functional wings</td>
<td>Least feasible Genetic contributors are currently only imagined</td>
<td>Any level of demand by parents is questionable</td>
</tr>
</tbody>
</table>

(Baruch, 2000, page 25: HGGM Applications: Technical Feasibility and Consumer Demand)

As this table shows and as the Baruch report and other publications explicitly point out, a clear distinction between therapy and enhancement techniques is not always possible. For example, germline modifications that are intended as “genetic vaccines” could also be considered as an enhancement of the immune system, a therapy intervention to cure the mitochondrial disease could also be used to increase a person’s general energy level because this is controlled by the mitochondria, etc. The website of genetics-and-society.org also points out the same issue (quote from the website on January 2nd, 2006): “The difference between non-heritable (somatic) and inherit-
able (germline) genetic modification is technical and clear-cut, but another crucial distinction—that between genetic modifications meant to treat medical conditions and genetic enhancements of appearance or performance—is inherently blurry. Most people would agree that genetic modifications to treat cystic fibrosis or muscular dystrophy would fall into the medical category. Genetic changes to endow musical talent, superior strength, or increased intelligence, or to choose the color of skin, hair or eyes, are fairly clear examples of enhancement. But would genetically engineered resistance to disease be considered medical treatment or enhancement? “

Fukuyama even goes so far to say that the notion of „medical problem“ that would justify a therapeutic intervention is somewhat arbitrary and artificial all together since it is all based on determining a certain „norm“ as the desirable state that we all have a right and maybe even an obligation to strive for. This however will have to be a somewhat arbitrary act. Let us suppose it were possible and technologically safe to increase the intelligence level of humans by germline modifications – when would this intervention count as a therapy of an unacceptable dementia and when would we label it to be enhancement? When there is a risk that the IQ of the child will be below 50? Or when it is below 100? Or shouldn't the top case always be the benchmark, so shouldn't Einstein's IQ of 200 still be an acceptable goal for „therapy“? In a later chapter about the definition of human nature we will come back to this very topic in more detail.

2.5.3. Estimating the Potential Demand

The Theoretical Market Size

According to the 2005 report of the World Health Organization, there are around 137 million human births per year. This is the theoretical market potential for genetic enhancement. Obviously this is only a very theoretical figure, since how many parents would actually demand genetic enhancement services for their intended offspring depends on a large number of factors, for example:

Safety: The new technology would only become approved and make it to market if and when the failure rate has dropped below what is perceived acceptable within a society.
Unique selling point: Other, technical alternatives would have to be less advantageous in some respect, either financial, safety, or other concerns. Here, a differentiated look at each single element of the great variety of conceivable GEHB technologies would be necessary to obtain meaningful estimates. It could very well be that, let us say in case of treating a precondition for depressions, GEHB might be the superior method while at the same time in case of boosting intelligence other, non-genetic methods are easier, safer, cheaper, etc. At this point it is pure speculation whether in case of this example it doesn’t turn out to be exactly the other way round. We will probably know more at some point within the next 20 years.

Pricing and financing: Financial feasibility is a major issue. For GEHB applications that are fully acceptable by society, payment might be provided by the health insurance systems in which case the number of individuals seeking treatment could be considerably high. For privately financed treatment the costs and income category of the parents determine the number of potential patients. An additional difficulty for any estimate is that economies of scale can be expected that could make the prices drop considerably depending on the number of cases treated.

Laws, culture, ethics, attitudes: Last, but not least, demand is also value-driven. For one thing in a direct sense that the number of potential consumers depends on what status GEHB develops in the minds of the people. Is intelligence-boosting viewed as „en vogue“ or is it considered „cheating“? Is genetic mood stabilization something that is frowned upon or is it regarded a clever method to provide the next generation with happier lives? These attitudes will also not be stable over time. Let us recall how attitudes have changed within the last 50 years towards various other methods of non-genetic brain enhancement, from learning with pictures and music to fighting stress-symptoms with meditation methods from the Far East. But values also determine legislation and laws determine consumer behavior. It is probably safe to say that most well-meaning parents would hesitate to undergo unlicensed treatment for their future children except when in a state of desperation. On the other hand, most parents-to-be are well-meaning and would probably at least consider anything for their future child that is within the realm of legal and authorized techniques.

Consumer demand is only one element in a cycle that is driven by many factors. The question of what demand there would be tomorrow if GEHB would be made possible today is neither a meaningful question, nor would
the answer be more than a snapshot of the situation at a certain point in time.

Moreover, most demand can be created or at least encouraged once a latent need can be detected and can serve as the initial seed. Seen from this perspective, it is actually astonishing that there are already some indications of an actual demand for a technology that does not even exist yet:

**Estimates Based on Actual Demand Cases for Genetic Enhancement, and Parents’ Spending Behavior**

One case of actual demand was already mentioned above. After watching the movie „Gattaca,“ thousands of people called the movie company to find out about real life possibilities of genetic enhancement. This is particularly astonishing as the fundamental message of the movie is actually quite critical of genetic enhancement.

Another, quite famous case of surprising demand for genetic enhancement services happened in a well known case example that happened in 1998: „In 1998 a new boutique, Gene Genies Worldwide, opened in a trendy shopping area in Pasadena, California. Its advertising offered „the key to the biotech revolution’s ultimate consumer playground.“ The store claimed to sell new genetic traits to people who wanted to modify their personalities and characteristics of their child. The boutique was filled with the vestiges of biotechnology—petri dishes and a ten-foot model of the ladder-like structure of DNA. Brochures highlighted traits that studies purportedly had shown to be genetic: creativity, conformity, extroversion, introversion, novelty-seeking, addiction, criminality, and dozens more. A few passersby denounced the owners as Nazis. But most people entered the store ready to plunk down their credit cards to change the genetic inheritance of their families. Shoppers initially requested one trait they wanted changed, but once they got into it, their shopping lists grew. Since Gene Genies offered people not only human genes, but ones from animals and plants, one man surprised everyone by asking for the survivability of a cockroach. The shop’s owners, T. Kim-Trang Tran and Karl S. Mihail, were thrilled at the success of their endeavor, particularly since none of the services they were advertising were yet available. Despite their lab coats, they were not scientists, but artists striving to serve as our moral conscience. „We’re generating the future now in our art and giving people the chance to make decisions before the services actually become available,“ said one of them. (Their exhibit now exists in virtual reality at www.genegenies.com.)“
McKibben, (2002, pp. 32-33) reports about two other examples that give us a glimpse of potentially powerful market forces:

- In the 1980s two drug companies started to market a hormone to foster growth of children who have a natural deficit and stay behind in their growth. The success was astounding as also parents whose children were only a little behind in their growth or parents who simply wanted their kids to grow tall did not hesitate to pay a total of $150,000 for a treatment with the drug.

- As cited earlier, when in-vitro fertilization became possible, ads appeared with would-be-parents looking for eggs from female human individuals who are tall, white and intelligent according to specified measures. The price offered per egg: $50,000.

If genetic enhancement were a normal and generally accepted means of taking care of your child, it is just a common sense assumption that most parents would want to have it for their offspring. Parents invest enormous amounts of money and work for bringing up their children. Just to give an idea: toy sales were $21.3 billion in 2005 in the United States alone. According to the National Center for Education statistics of the U.S. Department of Education, expenses on education in the United States are even more impressive: „In 2000, expenditures per student for the OECD member countries averaged $5,162 at the combined elementary/ secondary level and $9,509 at the post-secondary level. The United States and Switzerland, two of the world’s wealthiest nations, ranked highest in expenditures per student at the elementary/secondary and postsecondary level.” … „Between 1990 and 2000, the average price of attending college (tuition and fees plus an allowance for living expenses) increased at public 2-year institutions (from $7,300 to $8,500), at public 4-year institutions (from $10,000 to $12,400), and at private not-for-profit 4-year institutions (from $19,400 to $24,400)”

Source: nces.ed.gov/programs/quarterly/vol_6/1_2/7_1.asp#8; May 2nd, 2006.

These figures reflect the willingness of parents to invest in the well-being and future opportunities of their offspring. It also provides a glimpse of what kind of sums might be sitting on the demand side available once genetic enhancement becomes available and acceptable by wealthy societies.
Estimates Based on Opinion Polls

McKibben (2002, page 33) reports about a 1993 poll that found that 43% of Americans would engage in genetic engineering to enhance their children’s looks or intelligence. He concludes that this may be a good indicator of the demand for genetic enhancement in a future where it has become a safe technology.

The California-based advocacy group „Center for Genetics and Society“ published a list of opinion survey results on biotechnology issues like human cloning and on what the authors of the website call „inheritable genetic manipulation or IGM.“ They admit public opinion on IGM is difficult to assess because of the ambiguity of some of the questions and the terminology used. For example, 92% of Americans oppose using cloning technology to create genetically superior human beings, yet the most recent official U.S. government investigation in 1987 found that 44% approved of genetically improving children’s intelligence or physical characteristics. IGM does not automatically mean cloning, but in fact entails more intense intervention and is thus ethically much more relevant. Thus the results from these two surveys are so contradictory that they are hardly useful for policy making. As with research cloning, opposition to IGM decreases with increased emphasis on therapy and cures for disease and increases with emphasis on its non-medical uses. We have already seen in a previous chapter how problematic this approach can be since the distinction between therapy and enhancement is not scientifically clear. Here is a list of various survey results dated December 21st, 2005 that gives a good impression (see the following pages)

<table>
<thead>
<tr>
<th>Date</th>
<th>Population</th>
<th>Conductor</th>
<th>Question</th>
<th>Approve of IGM (%)</th>
<th>Disapprove of IGM (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2003</td>
<td>Australians</td>
<td><em>Bio-technology Australia</em></td>
<td>Correction of genetic disorders for embryos: morally acceptable?</td>
<td>79</td>
<td>-</td>
</tr>
<tr>
<td>Late 2002</td>
<td>Brazilians</td>
<td><em>Discovery Channel</em></td>
<td>Parents should be allowed to use gene technology to 'design'</td>
<td>-</td>
<td>82</td>
</tr>
<tr>
<td>Date</td>
<td>Population</td>
<td>Conductor</td>
<td>Question</td>
<td>Approve of IGM (%)</td>
<td>Disapprove of IGM (%)</td>
</tr>
<tr>
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<td>-----------------</td>
<td>--------------------------------------------------------------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Late 2002</td>
<td>Danes</td>
<td>Discovery Channel</td>
<td>Parents should be allowed to use gene technology to 'design'</td>
<td>-</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a baby to satisfy their personal, cultural or aesthetic desires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late 2002</td>
<td>Mexicans</td>
<td>Discovery Channel</td>
<td>Parents should be allowed to use gene technology to 'design'</td>
<td>-</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a baby to satisfy their personal, cultural or aesthetic desires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late 2002</td>
<td>Poles</td>
<td>Discovery Channel</td>
<td>Parents should be allowed to use gene technology to 'design'</td>
<td>~18</td>
<td>~67</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a baby to satisfy their personal, cultural or aesthetic desires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late 2002</td>
<td>Taiwanese</td>
<td>Discovery Channel</td>
<td>Parents should be allowed to use gene technology to 'design'</td>
<td>-</td>
<td>~67</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a baby to satisfy their personal, cultural or aesthetic desires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late 2002</td>
<td>Turks</td>
<td>Discovery Channel</td>
<td>Parents should be allowed to use gene technology to 'design'</td>
<td>43</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a baby to satisfy their personal, cultural or aesthetic desires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late 2002</td>
<td>UK</td>
<td>Discovery Channel</td>
<td>Parents should be allowed to use gene technology to 'design'</td>
<td>-</td>
<td>92</td>
</tr>
<tr>
<td>Date</td>
<td>Population</td>
<td>Conductor</td>
<td>Question</td>
<td>Approve of IGM (%)</td>
<td>Disapprove of IGM (%)</td>
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</tr>
<tr>
<td>Late 2002</td>
<td>Americans</td>
<td><em>Discovery Channel</em></td>
<td>Parents should be allowed to use gene technology to 'design' a baby to satisfy their personal, cultural or aesthetic desires</td>
<td>-</td>
<td>87</td>
</tr>
<tr>
<td>Oct 2002</td>
<td>Americans</td>
<td><em>Genetics and Public Policy Center</em></td>
<td>Approve if parents offered way to change their own genes in order to have children who would be smarter, stronger, or better looking?</td>
<td>20</td>
<td>76</td>
</tr>
<tr>
<td>Oct 2002</td>
<td>Americans</td>
<td><em>Genetics and Public Policy Center</em></td>
<td>Approve if parents offered way to change their own genes in order to prevent their children from having a genetic disease?</td>
<td>59</td>
<td>34</td>
</tr>
<tr>
<td>2002</td>
<td>Australians</td>
<td><em>Biotechnology Australia</em></td>
<td>Correction of genetic disorders for embryos: morally acceptable?</td>
<td>74</td>
<td>-</td>
</tr>
<tr>
<td>Feb 2001</td>
<td>Americans</td>
<td><em>Time / CNN</em></td>
<td>Does creating genetically superior human beings justify creating a human clone or don't you think so?</td>
<td>6</td>
<td>92</td>
</tr>
<tr>
<td>Fall 2000</td>
<td>Scots</td>
<td><em>System Three</em></td>
<td>Are opposed to the creation of „designer babies“ for any reason</td>
<td>-</td>
<td>~90</td>
</tr>
<tr>
<td>Date</td>
<td>Population</td>
<td>Conductor</td>
<td>Question</td>
<td>Approve of IGM (%)</td>
<td>Disapprove of IGM (%)</td>
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</tr>
<tr>
<td>Fall 2000</td>
<td>Scots</td>
<td><em>System Three</em></td>
<td>are prepared to accept „born-to-order“ babies for medical reasons</td>
<td>42</td>
<td>-</td>
</tr>
<tr>
<td>Mar 2000</td>
<td>Canadians</td>
<td><em>PricewaterhouseCoopers</em></td>
<td>Find genetic engineering to change the eye color or other physical features of an unborn child unacceptable.</td>
<td>-</td>
<td>74</td>
</tr>
<tr>
<td>Mar 2000</td>
<td>Canadians</td>
<td><em>PricewaterhouseCoopers</em></td>
<td>Find it acceptable for scientists to use biotechnology to cure an inherited medical condition or to decrease the risk of illness.</td>
<td>&gt; 50</td>
<td>-</td>
</tr>
<tr>
<td>1996</td>
<td>Americans</td>
<td><em>NCGR</em></td>
<td>How do you feel about scientists changing the makeup of human cells to prevent/stop children from inheriting a usually nonfatal disease?</td>
<td>72</td>
<td>-</td>
</tr>
<tr>
<td>1996</td>
<td>Americans</td>
<td><em>NCGR</em></td>
<td>How do you feel about scientists changing the makeup of human cells to improve the physical characteristics children would inherit?</td>
<td>35</td>
<td>-</td>
</tr>
<tr>
<td>1994</td>
<td>Japanese</td>
<td><em>Macer</em></td>
<td>How do you feel about scientists changing the makeup of human cells to prevent/stop</td>
<td>62</td>
<td>-</td>
</tr>
<tr>
<td>Date</td>
<td>Population</td>
<td>Conductor</td>
<td>Question</td>
<td>Approve of IGM (%)</td>
<td>Disapprove of IGM (%)</td>
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<td>---------------------------------------------------------------------------</td>
<td>---------------------</td>
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</tr>
<tr>
<td>1994</td>
<td>Japanese</td>
<td>Macer</td>
<td>How do you feel about scientists changing the makeup of human cells to improve the physical characteristics children would inherit?</td>
<td>28</td>
<td>-</td>
</tr>
<tr>
<td>1994</td>
<td>Australians</td>
<td>Macer</td>
<td>How do you feel about scientists changing the makeup of human cells to prevent/stop children from inheriting a usually nonfatal disease?</td>
<td>79</td>
<td>-</td>
</tr>
<tr>
<td>1994</td>
<td>Australians</td>
<td>Macer</td>
<td>How do you feel about scientists changing the makeup of human cells to improve the physical characteristics children would inherit?</td>
<td>28</td>
<td>-</td>
</tr>
<tr>
<td>Dec 1993</td>
<td>Americans</td>
<td>Time / CNN</td>
<td>Do you approve or disapprove of the use of genetic engineering to make it possible for nations to produce large numbers of individuals with genetically desirable traits?</td>
<td>8</td>
<td>88</td>
</tr>
<tr>
<td>1992</td>
<td>Americans</td>
<td>March of Dimes</td>
<td>How do you feel about scientists changing the makeup of human</td>
<td>66</td>
<td>32</td>
</tr>
<tr>
<td>Date</td>
<td>Population</td>
<td>Conductor</td>
<td>Question</td>
<td>Approve of IGM (%)</td>
<td>Disapprove of IGM (%)</td>
</tr>
<tr>
<td>------</td>
<td>------------</td>
<td>-----------</td>
<td>----------</td>
<td>--------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>1992</td>
<td>Americans</td>
<td>March of Dimes</td>
<td>How do you feel about scientists changing the makeup of human cells to improve the physical characteristics children would inherit?</td>
<td>43</td>
<td>54</td>
</tr>
<tr>
<td>1987</td>
<td>Americans</td>
<td>OTA</td>
<td>How do you feel about scientists changing the makeup of human cells to improve the physical characteristics children would inherit?</td>
<td>44</td>
<td>-</td>
</tr>
</tbody>
</table>


Most of these opinion polls targeted the population of Western countries and besides, they may be too old to be still valid in their message.  

A more recent opinion poll is presented by the already-cited Baruch report, written in the Bioethics Center of the Johns Hopkins University (Baruch, 2005, page 31): The Center’s 2004 survey of 4,834 Americans found relatively high levels of approval for the use of IGM (as well as other reproductive genetic technologies) for health-related reasons. In general, however, Americans appear to be ambivalent about IGM. For example, 57 percent approved of IGM to avoid fatal childhood disease while 19 percent approved of the use of IGM to have children with „desirable traits.“

I think that a share of around 20% of the American population in favor and interested in pure enhancement (no confusion with therapy possible) is
quite high, considering the technological situation and the moral stigma that is still attached to these technologies.

The Supply Side

A demand has to be met by a corresponding supply to form a market, in this case the supply would be met by the modern biotech industry.

The currently common segmentation of the business activities in the field of biotech is color-coded:

- „Red Biotech“: Pharmaceutical products
- „White Biotech“: Chemical production by genetically modified microbes
- „Green Biotech“: Genetically modified agricultural plants
- „Blue Biotech“: Marine technologies, e.g., for production of food in oceans.

The biotech industry so far has been highly scrutinized by the public and is in constant economic struggle. Investors consider it a hot area, in terms of both risk and potential gains. A consolidation wave is still being expected above all in the highly fragmented European biotech sector. The United States has a well established biotech sector with firms large enough to bear the high risks of research and development, but in general the sector is quite small compared to other sectors of the economy as the following table illustrates:

<table>
<thead>
<tr>
<th>Figures for 2003</th>
<th>U.S.</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnover</td>
<td>€ 37.1 billion</td>
<td>€ 6.2 billion</td>
</tr>
<tr>
<td>Expenses for Research &amp; Development</td>
<td>€ 16.0 billion</td>
<td>€ 3.3 billion</td>
</tr>
<tr>
<td>Number of Companies</td>
<td>1,444</td>
<td>1,815</td>
</tr>
</tbody>
</table>

Sources: Ernst & Young

(Just to put things into perspective: The revenues of car manufacturer DaimlerChrysler alone during just three months, April-June 2006, were € 38.6 billion with a profit of € 1.9 billion!)

Most of the research and application in human reproduction technologies, however, is left to the medical realm, particularly to the large and highly
specialized hospitals and the pharmaceutical industry. Both sectors have developed numerous ties to the biotech industry to secure a constant flow of research funding and know-how.

Thus the biotech industry is not of primary interest for the topic of this book, but whether the biotech industry will succeed or not is a crucial factor for the further development of genetic enhancement technologies in general. Only if and when the funding sources get an adequate return on investment will the funds for the necessary basic research keep on flowing from government and from private sources. And only if that happens, the further development of laboratory technologies, research on genetics, development of bioinformatics, cloning technologies, etc. will continue. Only under these conditions is there a possibility that GEHB might be developed one day. This is basically the core statement of Gregory Stock’s conversion theory as well.

Another question burdening the supply side is the uncertainty of intellectual property rights. Patent offices have registered many thousands of artificial genes of plants and animals as protected inventions, which could lead to the assumption that genetic modifications of humans are also a matter of normal patent office procedures. However, a closer look shows that there also seems to be a lot of confusion in this respect yet:

- The U.S. Patent Office and European patent offices have issued patents for the discovery of human genes, but it is completely unclear at this point whether this means that only the discoverer would have the right to modify these genes if that became legal and authorized.

- To make a point, the U.S. philosopher Jeremy Rifkin submitted an application for a crossing between a human and a chimpanzee, which he called a „humanzee.“. The U.S. Patent Office rejected the application because of ethical concerns. Most legal commentators agreed that the U.S. Patent Office has obviously overstepped its authority because it is actually not in a position to make decisions on ethical grounds. On the other hand, nobody took the U.S. Patent Office to trial so the uncertainty about the role of patent offices in case of germline engineering still exists.

- Most importantly, a genetically modified human being probably must be regarded as the owner of the modified gene. Unlike with genetically modified animals, society would probably not accept it ethically that a genetically modified person has to pay royalties to the inventor of the gene alteration for his or her own reproduction. Should cloning ever be-
come an acceptable method of reproduction then the situation would even become more aggravated still.

With so much speculation and uncertainty surrounding intellectual property rights and, thus, the income opportunities or the companies that might develop GEHB technologies, it is actually more likely that those technologies become reality as „fallout“ from other technological developments rather than because interested parties purposefully pursue their development. At least at this point in time this is so.
PART (III) PHILOSOPHICAL VIEWS
3. ETHICAL POSITIONS ON GEHB DERIVED FROM RELIGION-BASED ATTITUDES

3.1. Christian Views

When it comes to the ethical positions towards genetic enhancement, the most strongly communicated positions in Europe and North America are those of Christian organizations opposed to it. Christian organizations have traditionally been conservative on issues of reproduction technologies. This has led to the common perception that all Christian Churches and other organizations with a Christian background are also strictly opposed to any form of genetic enhancement. This chapter will show to what extent this opposition to GEHB really does exist in Christianity, whether it can be expected to continue and explore the deeper ethical grounds behind this opposition.

For the description of ethical positions towards GEHB, such considerations are not so much interesting for theological reasons as for three other reasons:

- As we will see in a later chapter, the proponents of GEHB quite often argue that opposing it is nothing else but a religious position in a secular disguise. In other words, there are no good reasons for opposing GEHB except the argument that this would be interfering with God, whose existence still has to be proven.

- In order to avoid just that impression, many theological thinkers try extra hard to put the secular arguments of their ethical position in the foreground. By doing so, an abundance of relevant arguments can be found in publications or by authors with a distinct religious background.

- The sheer power of figures makes consideration of religious arguments interesting. Christianity has a large proportion of the world
population as adherents including the billion or so people in the wealthy countries of Europe and North America.

But when one starts to look for the position of Christianity, the recognition of the difficulties of this endeavor appear very quickly and things become increasingly blurred.

The easiest approach in this respect is to portray the position of the Vatican, which claims to represent at least the Catholic part of Christianity. The Vatican does have a very clear position, reflected in the following article posted on the website of the Catholic News Service on September 20th, 2004: [http://www.catholicnews.com/]

"Vatican City (CNS). In a new document on the created world, the International Theological Commission warned that science and technology today offer the dangerous ability to 'alter man himself' and destroy the biological integrity of human beings.

"The document said the biblical call to 'stewardship' over the natural environment extends in a special way to safeguarding human life, which is created in God's image. This understanding clearly rules out human cloning, destruction of embryos, genetic enhancement, abortion or euthanasia, it said. The 46-page document, titled 'Communion and Stewardship: Human Persons Created in the Image of God,' was obtained by Catholic News Service in mid-September. The International Theological Commission is headed by Cardinal Joseph Ratzinger, the Vatican's chief doctrinal official. In discussing people's relationship with creation, the document emphasized Christian teachings against unrestrained economic development and environmental damage. It also addressed evolution, saying evolutionary explanations of biological development were acceptable as long as they did not exclude God as a transcendent cause or exclude the universe as a setting for 'a radically personal drama' involving God and man.

"A central question posed by the document was: 'How far is man allowed to remake himself?' The answer it offered was cautionary. While human beings are indeed agents, and not just passive subjects, of evolutionary development, they do not have a 'right of full disposal' over their biological natures, it said. 'The sovereignty we enjoy is not an unlimited one: We exercise a certain participated sovereignty over the created world and, in the end, we must render an account of our stewardship to the Lord of the universe,' it said. 'Man is created in the image of God, but he is not God himself,' it
said. The document cited several areas where the biological integrity of human beings may be threatened. It said:

- Human cloning is 'an infringement of the identity of the person.'
- **Genetic engineering aimed at producing a 'superhuman' is radically immoral.**
  
  "The uniqueness of each human person, in part constituted by his biogenetic characteristics and developed through nurture and growth, belongs intrinsically to him and cannot be instrumentalized in order to improve some of these characteristics," it said.

- Assisted suicide, direct euthanasia, and direct abortion -- however tragic and complex the personal situations may be -- wrongly sacrifice physical life for a 'self-selected finality.'

- **Germline engineering with a therapeutic aim would be acceptable, except it is today accomplished with unacceptable means, including the destruction of human embryos.**

- Birth control and sterilization render 'incomplete' the mutual gift of men and women.

"The document views all these issues through the lens of 'imago Dei,' a theology that affirms that humans are created in 'the image of God' in order to enjoy personal communion with God and among themselves and in order to exercise responsible stewardship of the created world. This theology emphasizes that man is not an isolated individual and that he cannot be made subservient to systems that are of this world only. A key part of the 'imago Dei' doctrine is that human beings are created with a specific male or female identity, the document said. 'The roles attributed to one or the other sex may vary across time and space, but the sexual identity of the person is not a cultural or social construction,' it said. The section on evolution discussed the need to reconcile the theology of creation with the modern scientific understanding of the universe. It cited strong scientific evidence that the universe erupted 15 billion years ago in a 'big bang,' that Earth was formed about 4.5 billion years ago and that the human species evolved in Africa some 40,000 years ago. Since it has been demonstrated that all living organisms on earth are genetically related, it is virtually certain that all living organisms have descended from this first organism,' it said. 'Converging evidence from many studies in the physical and biological sciences furnishes mounting
support for some theory of evolution to account for the development and diversification of life on earth, while controversy continues over the pace and mechanisms of evolution,’ it said. The document said the appearance of humans, marked by the development of the human brain, permanently altered the nature and rate of evolution. As human factors of consciousness, freedom and creativity were introduced, biological evolution was ‘recast as social and cultural evolution.’ In the context of evolution, the document said, the church teaches that the emergence of the first humans is an event that has no purely natural explanation and that can be ‘appropriately attributed to divine intervention.’ The document noted that some scientists rule out a divine cause by arguing that biological evolution is driven by natural selection and random genetic variation, not guided by a divine blueprint. But that argument shows a misunderstanding of the idea of ‘divine causality,’ which can be active in a process that is either guided or contingent, the document said. Editors: „Imago Dei“ was published in Origins, CNS Documentary Service, Vol. 34, No. 15, dated Sept. 23, 2004. END”

(The complete document „Imago Dei“ can be found on the following Website of the Vatican:


For the issue of GEHB this document „Imago Dei“ is a very strong and clear ethical statement of the Catholic Church:

- The Vatican clearly considers GEHB to be „radically immoral.“
- The document was created by a working group that started the discussions in the year 2000, evidently under the impression of the results of the Human Genome Project, – and this is so recent that it can hardly be seen as an outdated position.
- The fact that it took 4 years to create a 46 page-document indicates that decisions were not made swiftly and lightheartedly.
- The International Theological Commission of the Vatican that created the document was chaired by Cardinal Ratzinger, who became Pope Benedict XVI in 2005. This both highlights the importance of the subject for the Catholic Church and increases the authority of the document for all followers of the Catholic Church.
In summary, the position of the Catholic Church does not leave much space for doubts or ambiguities. It is difficult to see how something that is categorically declared „radically immoral” under the circumstances could ever become morally acceptable.

And yet, there are three issues that deserve further scrutiny in order to fully grasp the attitude of Christianity towards GEHB:

- First, one should have a second look at the stability of the views of the Vatican in the long run in other cases, and then come back to a guess how firm the view might be that is outlined in the document „Imago Dei“ of 2004.

- Second, one should question the unity of the Christian church in general and should then ask whether there is unity in the questions concerning GEHB.

- Third, one should investigate the relationship between views on something as new and modern as genetic enhancement and ancient religious traditions in general.

Let us turn to the long term stability of the ethical position on genetic enhancement to derive assumptions about the potential flexibility of Christianity in the future based on the Vatican’s changing views on related topics in the past.

A closer look at the history of the Vatican’s views shows that there has always been much more flexibility than one would expect from such an organization. A good example of this surprising flexibility is the view of evolution that is also mentioned in the very document „Imago Dei.” The acceptance of the Darwinian evolutionary theory which has been a major threat to the theorems of Christianity for a long time came in 1996 after this theory has been fiercely battled for almost 150 years. In 1996 Pope John Paul II sent a message to the Pontifical Academy of Science that reversed the encyclical „Humani generis” of Pope Pius XII of some 50 years earlier. In this document, the Pope writes that „... new knowledge has led to the recognition of the theory of evolution as more than hypothesis. „ (John Paul II: Message to the Pontifical Academy of Sciences” October 22nd, 1996). In the same document the pope insists, however, that the theory about the dualism of body and spirit remains untouched: „... theories of evolution which ... consider the mind as emerging from the forces of living nature, or as a mere epiphenomenon of this matter, are incompatible with the truth about man.” (See also Fukuyama, 2002, page 161).
What helped to eliminate the friction between the words of the bible and the scientific theory of evolution is the clever explanation that the scientific evolutionary theory implies that at some point in time there must have been one specific genetic mutation that was the starting point for the development of the human self-reflection. This very moment must be regarded as the Godly intervention for the creation of mankind. For the Vatican this divine action constitutes the injection of soul into humankind, so to speak. Thus, Christianity has become fully compatible with Darwinian evolutionary theory. This very pragmatic integration of scientific evidence into the worldview of Christianity reinterprets the biblical story and ignores the literal interpretation of the Bible in which the history from Adam and Eve to the birth of Jesus Christ can be calculated to be approximately 5,000 years in duration. This last fact is one of the reasons why creationist fundamentalists in Kansas, Pennsylvania, and other places in the U.S. still insist on teaching the biblical version of evolution in schools, which is contradictory to what the Vatican says.

Creating a peaceful link between the ancient teaching of the bible and the overpowering evidence of modern science is not solely a concern of the Vatican alone. For example, the ultra-conservative Center for Bioethics and Human Dignity in Illinois, U.S., has members of all fractions of Christianity. The following quotes are taken from an article posted on the organization’s Website www.cbhd.org/resources/biotech/garner_2004-05-28.htm date December 10, 2005 by professor Patrick Garner on May 28, 2004: „As a Christian, I want to harmonize current research that shows human behavior to be substantially chemically/genetically based with what Scripture seems to teach about the supernatural basis of such behavior. By looking at both science and Scripture, we may gain great insights into the overlap between the physical and spiritual components of human beings. I would like to suggest that brain chemistry and genetic structure are vehicles through which the supernatural element of a person affects his or her external behavior. Based on our present knowledge of genetics and neurochemistry, it seems legitimate to posit that the Holy Spirit can affect spiritual growth--or produce the 'fruit of the Spirit'--at least in part by changing genes or the levels of certain chemicals in the human brain. When the believer yields herself to the Holy Spirit for the process of transformation, the mode whereby changes occur could certainly be physiological to some significant degree--be it via an alteration of serotonin or dopamine levels or through some other mechanism. On some level, there has to be a meeting or interface of the physical and the
supernatural. If we believe that the Holy Spirit is within the believer producing behavioral fruits such as peace and joy, how does this occur? Such transformation appears to be mediated through a physical substrate to some degree, and research seems to show that genes and brain chemicals are such substrates. In addition to the Holy Spirit intervening in such a way, Satan could, via genetic or neural alteration, conversely stimulate a person to manifest the works of the flesh."

Indeed, it seems that with its limitation on human beings being the only object of God’s untouchable nature, Christianity also has already opened the door to accepting genetic engineering to a great extent. For example, to the dismay of all strict environmentalists, in September 2004 the Vatican had another surprise ready for its followers: on the initiative of the U.S. ambassador to the Holy See, the Vatican hosted a conference about genetically enhanced crops. The official statement published after the conference by the spokesperson of the Vatican for biotech topics sounded like this: „Botanist Peter Raven, a member of the Pontifical Academy of Sciences, said that the opponents of biotech ‘don’t really have the right information about the new science.’ Raven added: ‘It would be very foolhardy to not use [biotech crops], particularly in a world that needs to feed so many people.’ Father Gonzalo Miranda, dean of the bioethics school at the Regina Apostolorum Pontifical University, also expressed support for biotech crops. Invoking the book of Genesis, Father Miranda explained that mankind is the ‘gardener of creation.’"


Looking at the history of Christianity, it seems that allegedly stable and rigid institutions like the Vatican have always adapted to sufficiently strong pressure from lobbyists, scientific evidence, politics or market forces. Just to quote one of many examples, in the novel „The Physician” by Noah Gordon, the protagonist of this novel had to travel to Islamic Isfahan since he desperately wanted to find out what a human body looked like from inside. Living in England of the year 1021, this was not possible. The Church of that time regarded autopsy as evil and lawmakers had followed this idea with strict punishments foreseen in the criminal justice for any cuts performed on a human corpse. It took until the French revolution that this bastion of belief was destroyed and the gate opened wide for medical research in Europe as well, simply because it made sense to do this from a utilitarian
point of view. At that point the Christian Church also stopped opposing autopsies.

But a closer look shows that the modification of the view that God’s creation is untouchable has been softened step by step since the 12th century. The acceptance of genetically modified food crops is by no means a quick and spontaneous turn of the Vatican. Rather it is the latest step in a current within Christianity that regards humans as the „delegates” of God on earth who have the freedom to change his creation, but also have the obligation to do so with responsibility and care. This development in its early stages is described by Colin Morris in *The Discovery of the Individual*, 1050-1200; University of Toronto Press 1987 (first published in 1972).

Thus it is likely that one day the Vatican might approve of genetic enhancement of human beings after all by inventing some pragmatic philosophical bridge that can justify it. This cannot be said for sure, but Christian churches have made all kinds of radical mental turns in the past. Some of the clergy did not hesitate to sanction the extinction of the indigenous peoples in the Americas, representatives of the Protestant and of the Catholic Church gave the holy sacrament to the cannons that Hitler’s armies used for attacking the whole world, just to name a few more examples about the potential flexibility of the Christian church organizations in the long run. Church politics is just that – *politics* - defined as the art of what is possible. History teaches us that church organizations and their committees, their managers and their figureheads are more pragmatic than it seems at first sight.

It is also important to recognize that talking about the „views of Christianity“ is actually a gross simplification. Shermer (2002, page 160) points out that according to the World Christian Encyclopedia of 2001 there are 33,820 different denominations of Christianity, which means that there must be an astounding variety of views under the roof of Christianity as well. Just to quote one example: while groups like the Mennonites, Mormons and Amish (who are so religiously conservative that they have even become a tourist attraction) accept treatment with psychotropic drugs when there is a medical necessity, the more upscale Scientology Church (with celebrity members such as Tom Cruise) strictly rejects any form of psychotropic drug even for therapy. It would be beyond the scope of this book to investigate all those shades of views, opinions and theological interpretations that exist in all of the subgroups of Christianity, but it should be kept in mind that they are to a large extent heterogeneous groups.
One of the most important moral views shared by most Christians in spite of all the variety seems to be the rejection of the pride that is perceived to be behind any form of genetic enhancement. This is very clearly stated in the following quote by Dr. Ted Peters, a professor of Systematic Theology at Pacific Lutheran Theological Seminary and at the Graduate Theological Union (GTU) in Berkeley, California, in an article about bioethics and Christianity (www.meta-library.net/genetics/genetics-print.html - 54k - copied from there on December 12th, 2005), in which he very much focuses on this aspect: (reformulate and shorten this quote)

„... The debate over advanced genetic engineering such as germline intervention brings us directly to the questions popularized by newspaper headlines: Should we ask our scientists to play God? Or, should we ask them to refrain from playing God? The way the questions are posed in the press is usually so superficial as to be misleading. Yet, beneath the superficiality we find theological issues of some consequence, namely, do we, as human beings, share with God some responsibility for the ongoing creativity of our world?

The rhetoric that usually employs the phrase, „play God,“ is aimed at inhibiting, if not shutting down, certain forms of scientific research and medical therapy. This applies particularly to the field of human genetics and, still more particularly, to the prospect of germline intervention for purposes of human enhancement—that is, the insertion of new gene segments of DNA into sperm or eggs before fertilization or into undifferentiated cells of an early embryo that will be passed on to future generations and may become part of the permanent gene pool. Some scientists and religious spokespersons are putting a chain across the gate to germline enhancement and with a posted sign reading, „Thou shalt not play God.”..... Why do critics of genetic research prescribe a new commandment, „Thou shalt not play God”? The answer is that human pride or hubris is dangerous. We have learned from experience that what the Bible says is true: „pride goes before destruction” (Proverbs 16:18). And in our modern era, pride among the natural scientists has taken the form of overestimating our knowledge, of arrogating for science a kind of omniscience that we do not in fact have. Or, to refine it a bit: „playing God” means we confuse the knowledge we do have with the wisdom to decide how to use it. Frequently lacking this wisdom, we falsely assume we possess beneficial scientific knowledge, which then leads to unforeseen consequences, such as the destruction of the ecosphere. Applied to genetic therapy, the com-
mandment against „playing God” implies that the unpredictability of destructive effects on the human gene pool should lead to a proscription against germ-line intervention.

A related implication of the phrase, „playing God,” is that DNA has come to function in effect as an inviolable sacred, a special province of the divine that should be off limits to human tampering. Robert Sinsheimer, among others, suggests that when we see ourselves as the creators of life then we lose reverence for life. It is just this lack of reverence for life, as nature has bequeathed it to us, that drives Jeremy Rifkin to attack the kind of genetic research that will lead to algeny; that is, to „the upgrading of existing organisms and the design of wholly new ones with the intent of ‘perfecting’ their performance.” The problem with algeny is that it represents excessive human pride. „It is humanity’s attempt to give metaphysical meaning to its emerging technological relationship with nature.” Rifkin’s message is that we ought to let nature be. In advocating this hands-off policy, Rifkin does not appeal to any particular theological principles. He issues his own missionary’s call: „The resacralization of nature stands before us as the great mission of the coming age.”

There is a very secular conclusion hidden within this theological argument that is offered by a theology professor: When humans lack humbleness and when they become too proud they tend to make mistakes. Mistakes of the kind that have caused their eviction from paradise once before when there was only Adam and Eve and, therefore, they should stay away from things they do not understand sufficiently. What this comes down to is distrust into the ability of humans to foresee and manage the effects of nature-changing technologies like genetic enhancement – a very modern argument that we can find in the different approaches to technology assessment as well and which will be discussed later in this book.

John Dickson, the Australian bestselling author of Christian literature, identifies this semi-secular undercurrent even more clearly by pointing out that it all depends on the premises whether you regard something like pain as completely negative and something that has to be eliminated immediately or if you humbly assume an intrinsic value even in pain that is beyond human understanding. Here is the choice of perspectives that he gives in his book „If I were God I’d end all the Pain.”
Perspective A:

<table>
<thead>
<tr>
<th>Assumption 1:</th>
<th>An all-powerful God would be able to end suffering.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumption 2:</td>
<td>An all-loving God would desire to end suffering.</td>
</tr>
<tr>
<td>Assumption 3:</td>
<td>An all-powerful, all-loving God, therefore does not exist</td>
</tr>
</tbody>
</table>

Perspective B:

<table>
<thead>
<tr>
<th>Assumption 1:</th>
<th>An all-powerful God exists.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumption 2:</td>
<td>An all-loving God exists.</td>
</tr>
<tr>
<td>Assumption 3:</td>
<td>God must have some loving reasons (which he is able to achieve) for permitting suffering.</td>
</tr>
</tbody>
</table>

(Dickson, 2002, pp. 15-16)

As a Christian, Dickson favors perspective B and the rest of his book deals with the reasoning for this position. As the struggle against pain and suffering is one of the important potential goals of GEHB, this statement is very relevant here.

Put in secular terms, perspective A implies the following:

- Pain is “useless” in a utilitarian sense;
- Thus, it is to be eliminated as much and as quickly as possible;
- Since there is obviously no “upper management“in place that directs all the developments of nature in a contradiction-free manner we, the humans, have to do the job ourselves.

Perspective B, on the other hand, is in its core contents very similar to the arguments used by clearly secular authors like McKibben and Fukuyama. Both of them, and many others, claim that „biological shortcuts“ (Fukuyama) to goals like avoiding pain would only take us to the desired goals of a more meaningful life if we humans were able to overview all the relevant aspects of such an action. McKibben, Fukuyama and others are convinced to the same degree that this will not be the case, just as Dickson is convinced that we should trust in a higher power's having good reasons for not eliminating pain. One of John Dickson’s major messages is that even pain does
not exist in spite of God’s love for us but because of his love. Thus he claims there is a higher purpose of natural features like pain that we might not fully understand. We would be arrogant and short-sighted to act as if we could.

It must be left to further research of the history of philosophy how this overlapping of religious and secular ideas developed in history, e.g., what role did the pre-Christian idea of hubris play in ancient Greece? In any case, the preference of humility and the rejection of pride seem to be a cultural feature that plays an important role for the ethical evaluation of GEHB which is strongly emphasized by Christianity for theological reasons. Humility could be very much one of those requirements that early human cultures used in order to assure peace within their societies. Somebody who is humble does not question authority and does not try to impose his ideas on others with force. Humility is also a feature that makes leadership and control of peace easier for the leaders, a major problem in the early years of human development when modern, well organized justice systems did not exist. Of course, what could have been a leadership tool in prehistoric times when religions started emerging also had the potential to develop into the ideological basis of repressive systems later on. After all, only a few centuries ago the Catholic Church used to promote the thought that the authority of the aristocracy in feudal structures was directly given by God, thereby opening the door for feudal exploitation.

The typical „blind trust in God“ demand, therefore, has become a questionable concept in cultures where negative historic experiences with religion-based repression are part of the collective memory. This is why people like John Dickson have a difficult stand with their view in most European countries and a more modern, more moderate and more subtle version of Christianity has evolved there during the last 200 years. With this development other concepts have come in the foreground that still determine the ethical thinking much stronger than blind trust in God today. These concepts are human dignity, human rights and other theories about human nature that will be discussed later in this book.
3.2. Muslim Views

Islam, like Christianity, is a religion based on the belief in a creator. As such there is full agreement between these two religions about the rejection of all forms of genetic enhancement.

Indeed, there are a number of Islamic publications mentioning the question of genetic enhancement as an issue on the side, while the main statements usually concern issues like abortion, the beginning and the end of life and the use of reproduction technologies. I was not able to find any published material from authors who posses official authority to speak for the whole of Islam and in which the issue of GEHB was explicitly discussed. Like in Christianity, such an authority does not really exist and one can only make guesses on how genetic enhancement might be seen by the majority of Muslims by analyzing the statements that were published about cloning following the years after the birth of clone sheep Dolly in 1997. From this we can try to deduce what the Muslim authors considered the most pressing ethical issues in this neighboring field.

The statement carrying the greatest weight within Sunni Islam comes from the IFA which is the Islamic Fiqh (Fiqh = Islamic Jurisdiction) Academy in Jeddah, Saudi Arabia, dated July 1997. This document is the result of conferences that were held at the IFA and in Casablanca in June 1997 on cloning. This statement was also adopted by the European Council for Watwa and Research, Dublin, in its 10th Ordinary Session in January 2003. (http://www.e-cfr.org/eng/). Its preamble states very clearly that God has created human beings in a perfect form and that there is no room for improvement when it comes to its natural form. The struggle for perfection should, thus, happen within the realm of morality (i.e., the Islamic way of life) and not within the realm of biological design. As a logical consequence, all scientific research has to go through the „filter” of the sharia (Islamic law) and any technology that makes humans deviate from the way God has placed them on is not allowed. It becomes quite obvious that genetic enhancement fully falls under this rule from the wording of this document and even genetic engineering of animals other than microbes is rejected. The Website www.islam-qa.com that lists all the official rulings of these leaders of Islam by index words provides an English translation of the exact wording of the ruling that is the most valuable source when judging what the Muslim world might think about GEHB (index search word „cloning” pro-
vided the following answer on December 18th, 2005, the index words „gen-
etic enhancement” and „genetic engineering” are not listed):

„Question:
What is the ruling on cloning of human beings? How does it affect lineage, mar-
riage, inheritance and other rulings on family matters? …
Answer:
Praise be to Allah.
Allah has created man in the best of forms, and bestowed upon him the greatest hon-
ors. Allah says (interpretation of the meaning): „And indeed We have honored the
Children of Adam, and We have carried them on land and sea, and have provided
them with Al-Tayyibat (lawful good things), and have preferred them above many
of those whom We have created with a marked preferment”

[al-Israa’ 17:70] Allaah has honored him with reason and responsibility, and has
made him a khaleefah on earth, to populate and develop it. He has honored man by
giving him the Message which suits his fitrah (natural state), indeed it is that fitrah
itself, as Allaah says (interpretation of the meaning): „So set you (O Muhammad)
your face towards the religion (of pure Islamic Monotheism) Haneef (worship none
but Allaah Alone). Allaah’s Fitrah (i.e. Allaah’s Islamic Monotheism) with which
He has created mankind. No change let there be in Khalq-illaah (i.e. the religion of
Allaah Islamic Monotheism), that is the straight religion, but most of men know
not” …

Islam does not place any restrictions on the freedom of scientific research, or place
any obstacles in its way, because it is a means of understanding the laws of Allaah
in His creation, but Islam also stipulates that this cannot be left without any guide-
lines or regulations on the introduction of scientific results into the public domain
without first passing them through the sieve of sharee’ah, so that that which is per-
missible may be allowed through whilst that which is haram is prevented from
passing. So it is not permissible to implement something simply because it can be
implemented, rather it has to be beneficial knowledge which serves the interests of
mankind and protects them from harm; this knowledge has to protect the dignity of
man and the lofty purpose for which Allaah created him. So man should not become
the subject of experimentation, and scientific research should not impinge upon the
unique identity of the individual and his distinct characteristics, or lead to disrup-
tion of the social framework or dissolution of the foundations of kinship and lineage,
or the family structure that has been known throughout human history in the shade
of Allaah’s laws and on the solid foundation of His rulings. …
„And indeed We created man (Adam) out of an extract of clay (water and earth). Thereafter We made him (the offspring of Adam) as a Nutfah (mixed drops of the male and female sexual discharge and lodged it) in a safe lodging (womb of the woman)

Then We made the Nutfah into a clot (a piece of thick coagulated blood), then We made the clot into a little lump of flesh, then We made out of that little lump of flesh bones, then We clothed the bones with flesh, and then We brought it forth as another creation. So Blessed is Allaah, the Best of creators” [al-Mu’minoon 23:12-14]

Based on the discussion above, the Committee has decided the following:

(1) That human cloning using the two methods mentioned, or any other method that leads to reproduction of human beings is haraam.

(2) If there is any transgression of the shar’i ruling mentioned above, then the consequences of that should be discussed to explain the shar’i rulings concerning such cases.

(3) All scenarios in which a third party may be added to the marital relationship are forbidden, whether that involves a womb (surrogacy), eggs, sperm or cells for cloning.

(4) It is permissible in Islam to use the technology of cloning and genetic engineering in cases of germs and microscopic creatures, plants and animals, within the limits and guidelines of sharee’ah, for the purpose of serving interests and warding off harm.


When one enters „genetic enhancement, cloning, genetic manipulation, etc. into the Internet search engines in connection with the words „Muslim” or „islam,” very few hits appear and only fewer really deal with the issue of genetic enhancement per se. Given the scarcity of this material it is simply not possible to make conclusions about „Islamic opinion” on the issue. The following two random quotes just give a taste of what it might be or what it could become in the future.

An article published on February 12th, 2005 in English on the Tunisian Islamic Website www.nawaat.org by the political science professor Dr. Sohail Inayatullah confirms the traditional views and quotes an Islamic scholar Abdulaziz Sachedina as saying: „In Islamic discussions in eugenics, there is almost a consensus among Muslim scholars that it „having better rather than worse genes” does not play a part in the recognition of the good qualities of human beings; it is something that is designed by God, and therefore, it should be left to God, so there is no incentive for the improvement of the
genetic composition of individuals to increase the value of that individual. Rather, the value of the individual depends on faith. There is no encouragement of any kind to improve genetic composition through any kind of surgical or any kind of medical or choices to the marriage decisions; rather, the will of God is regarded as the one that really creates human beings the way they are, and there are potential improvements within that if faith is maintained, if moral and spiritual awareness are maintained within the life."

In a 1998 article on „Reproductive Choice: A Muslim Perspective,” Gamal Serour makes a very focused statements on genetic enhancement on humans by means of germline engineering from an Islamic point of view:

„From a Muslim perspective human gene therapy should be restricted only to therapeutic indications. Somatic cell gene therapy is encouraged as it involves the remedying and alleviation of human sufferings. However, enhancement genetic engineering or eugenic genetic engineering would involve change in the creation of God, which may lead to imbalance in the whole universe and should be prohibited. Gene therapy to manipulate hereditary traits such as intelligence, stupidity, stature, beauty, or ugliness is a serious act as it may unbalance the life of man.”

(http://www.gendwaar.gen.in/ReproductiveRights/RR22.htm#31 on December 18th, 2005)

From these quotes, at least, Muslims are even more explicit than most Christians when it comes to rejecting any form of genetic enhancement.
3.3. Hindu and Buddhist Views

3.3.1. Hindu Views of Genetic Enhancement

Hindu bioethics so far is a very exotic field so there are not many publications on that topic at all. Moreover, Hindu bioethics so far has focused mainly on issues like clinical research. After suspicions became public that Western pharmaceutical companies may be performing unethical testing of new drugs on patients in India, this became a popular field for some time during the first years of the 21st century, including the role of the family in decision-making on a patient’s treatment, etc., in brief - mainly on medical ethics. Hindu bioethics is famous and well discussed concerning issues of animal protection. Gandhi’s view on „cow protection,” which actually entails the protection of all animals from maltreatment by human beings, is actually a very modern one since there is now also a very active animal protection community in the West promoting the idea that animals have the natural right to be protected from harm and suffering just like humans do. This issue has potentially wide ranging economic and life style implications for how we breed eat and deal with animals in large parts of the world. It is no wonder that this stand of the Hindu-Buddhist culture is discussed in philosophical publications with greater interest than issues like GEHB.

There are not many published statements from which the position of Hindus concerning GEHB could be derived and how they might differ from Christian or Muslim views. But it begs the question: how can it be that the followers of a religion most of whom live in India, a country with a booming biotech industry, do not really care about the philosophical implications of genetic enhancement?

For example, on August 10th, 2004, an editorial article about the genetic enhancement of athletes appeared in „The Hindu”, one of the large and more upscale daily newspapers of India. Not only did the author not immediately reject the possible practice, but pondered whether this might be considered to be unfair and illegal doping once it happens. One can assume that an article like this appearing in Le Figaro, the New York Times or the Frankfurter Allgemeine Zeitung would have caused an outcry and a quick apology of
the newspaper’s chief editor. But does that mean that Hindus are careless about genetic enhancement or that they even approve of the idea, contrary to the general sentiments of Christianity or Islam?

It may not be a coincidence that the person who has probably published most extensively about the bioethical views of the Hindu religion so far does not live in India but is teaching as a professor for Hinduism in a university in the United States. - S. Cromwell Crawford, who chairs the department of religion of the University of Hawaii. In his 2003 book „Hindu Bioethics for the 21st Century” he deals with the most common issues of bioethics and genetic enhancement. In 2003 he also published an article on „Hindu Perspectives on Genetic Enhancements in Humans” in Update, a magazine of the „Loma Linda Center for Christian Bioethics” in which he outlines the main traits of the general Hindu world view and discusses consequences for the judgment of Hindus on genetic enhancement. Professor Crawford comes to the following conclusions:

„In conclusion, the evolutionary orientation of Hindu bioethics does not permit it to make a blanket condemnation of genetic enhancement as intrinsically evil, on the grounds that it ‘meddles with nature’ or ‘plays God’, and therefore must be banned forever. Instead, it counsels that we start with the person, holistically understood, which then necessitates an evaluation of all means of genetic enhancement by the moral yardstick of whether they do indeed contribute to the betterment of ourselves and our children, or whether they have karmic consequences that are hidden from our present view. Given the present limitations of our knowledge in the field, Hindu ethics goes beyond current debates about what is ‘normal’ and ‘abnormal’, or the fine distinctions between ‘therapy’ and ‘enhancement’ and gets to the bottom line dictated by the universal principal of ashima – do not harm. In a situation where life is threatened by diseases, the risk of harm may justify treatment, but in a scenario where the end of gene therapy is nonessential, the therapy is not supported by ashima, because risks loom larger than benefits. Further, given the Hindu understanding of health as the condition of spiritual well-being, all efforts at genetic enhancement of human beings must ultimately help, and not hinder, the process whereby the human spirit may flourish. Thus the concept of health helps distinguish between needs and wants. The betterment of humanity is not in question; only the means which must be consistent with the end of human wholeness. How we ought to proceed to address this general goal is not revealed to us by some deity who has the details of what we are supposed to do. Therefore we must use
our own intelligence to apply spiritual wisdom to the special circumstances in which we and those who serve find ourselves. The essence of that wisdom is captured in these words of Gandhi: ‘As human beings, our greatness lies not so much in being able to remake the world as in being able to remake ourselves’.

See Website http://www.llu.edu/llu/bioethics/update/update184.pdf
(Quote dated December 20th, 2005)

Via the Google search engine only two articles can be found on Hindu bioethics. Both of them confirm Prof. Crawford’s assessment. The following quotes from the website www.eng.vendanta.ru/library/ were posted there in March of 2005:

The first article, written by Swami Satyaswarupananda on Hindu views on cloning, states:

„The justification for cloning and related issues of bioethical concern must ... be sought not in the specifics of these processes, but in the motives that impel us to choose them. It is up to the concerned individuals to be clear about their motives, and for society to exercise control when the motives of its members go astray. An accurate understanding of the scientific facts is, for sure, necessary to clear misconceptions and prejudices before one can arrive at a sound ethical judgment; but deeper ethical issues may prove more intractable.”

The second article, written by Swami Jitatmananda with the title „Bioethics for Science and Technology: a Hindu Perspective” repeats this cautious approach towards biotech and the emphasis on the spiritual purpose it could serve once it is applied with the right motives:

„Science has opened two avenues for us: power and knowledge. Power corrupts and absolute power corrupts absolutely. Human beings are generally more drawn to the power aspect of science brought about by the technological revolution. In the glare of technology we have sometimes lost sight of the knowledge aspect of science, which alone encourages holistic ethics and elevates us from the snares and pulls of a purely individualistic, self-centered existence, and unites us with the whole of mankind.

“Technologically advanced societies, both in the East and in the West, are in the grip of deep socio-ethical turbulence. ... Ethical problems are knocking even at the doors of the biggest political power. ... Science and technology have enriched external life in a thousand ways, but in many
places have created more and more of a vacuum in internal life because of confused ethical values.”
One could almost speak of a „spiritual utilitarianism” that those Hindu scholars seem to promote here. This could be defined as a general willingness to approve whatever serves best to reach the ultimate goal of furthering the inner well-being, the acquisition of the ultimate wisdom of oneself and liberation from the bondage of one’s physical existence. If it serves that holistic purpose, even genetic enhancement would find the approval of the Hindu scholars who wrote these articles.
But there is also great doubt voiced in these publications on whether genetic enhancement can possibly be applied in an ethical way, meaning without doing harm to anybody in the process, and whether the goal of ultimate wisdom can really be achieved by genetic enhancement or whether it is just another useless step on the endless ladder of human vanities.

3.3.2. Buddhist Views of Genetic Enhancement

According to Jens Schlieter, Buddhists mainly share this line of thinking on genetic enhancement. Jens Schlieter is working as a professor of comparative religion sciences at the Ludwig Maximilian University of Munich and the University of Bern and has done extensive research on Buddhism and bioethics. His contribution to a book on „Cross Cultural Issues on Bioethics – The Example of Human Cloning“ (Amsterdam, 2006) is available on the Website of the Ruhr University in Bochum and outlines the basic principles which Buddhists will use to come to a judgment on any bioethical issue:

„In the following I shall consider Buddhist ethical thoughts under four European philosophical headings and try to show how these Buddhist principles guide the Buddhist discourse ….

‘Intentionalism’: Buddhist ethics are strongly based on (the examination of) the intention of the doer of deeds. Intentions can be wholesome or unwholesome. If the intention governing a deed is to harm or kill a living sentient being, that deed is seen as unwholesome. Other unwholesome intentions are ignorance, greed, fanaticism and delusion. Wholesome intentions, on the other hand, are characterized by the intention of „non-harming“ (ahimsā), compassion, and the attitude of loving kindness, a love that embraces all beings. Schools differ in their understanding of the application of
these principles, e.g., whether compassion implies „action” or just a mental attitude towards others.

‘Considering consequences’ (for the doer/the one who is treated): Buddhists also consider the outcome of actions. Important here are not the consequences for possible victims, but the consequences for the doer of deeds. Unwholesome actions, it is believed, will assemble bad Karma and therefore imply an effect on the next rebirth. So it has a direct effect on the perpetrator’s next life. A consequentialist (not synonymous here with utilitarian) approach naturally allows a certain ‘weighing’ of anticipated effects: A deed may have more than one effect or, combined with the core element of ‘intention’ (see above), it can be expected to produce a main good effect that may involve certain bad side-effects.

‘Contextualism’/‘situative ethics’: Buddhist ethics can also be characterized as ‘contextual’ (situative ethics), due to the fact that instructions differ in relation to the spiritual status of the people involved. Monks and nuns observe a large number of rules, and in Mahāyāna schools there are further distinctions in ethics according to the spiritual progress achieved by the doer. Buddhist ethics generally follow a „gradualist approach” (Harvey 2000, 51), and its application is quite flexible. Several programmatic advices describe a situative selection of possible means. Sometimes the advice is given not to stick to dogmatic decision or to adhere slavishly to „views.”

‘Self-cultivation’: Last but not least, Buddhist ethics originally serve as a means to liberation. To act „skillfully” and „wholesomely” is a necessary precondition for achieving this goal. By their nature, Buddhist ethical codices of monastic discipline were formulated as training rules. Of course, they express the goal to be generally pursued by Buddhists (see also „Contextualism”), but nevertheless the conception of ethics as self-cultivation implies that „immoral”, faulty behavior may occur. Its occurrence, indeed, may lead the perpetrator to intensify his or her personal efforts, because, according to the Buddhist standpoint, the doer of wrong deeds harms him or herself first and foremost, whereas good deeds contribute to the accumulation of merit.

Obviously these characteristics of an „intentionalist”, „consequence-orientated”, „contextual”, „offender-centered” and „self-cultivationist” ethics will have a considerable effect on the Buddhist assessment of human cloning. The most important difference to Western ethics, according to my understanding, may be seen in the lack of a universalist reasoning based on the idea of „dignity”. „

Similar to Hinduism and very different from Christianity and Islam, the Buddhist view is not based on the idea of a creator. It thus leaves the presumed limits predetermined by this creator is not one of the possible arguments against genetic enhancement.

While Christianity and Islam sees human beings as a distinct category between God above and the realm of the animals below, this clear distinction does not exist in Buddhism:

• Through enlightenment, every human being can become a Buddha and thus close to what Western cultures might regard as „closer to God;“

• At the same time, since it is possible for a human being to be reborn as a human being or as an animal, for a Buddhist it is not understandable why human suffering and the suffering of an animal should be regarded in a different way.

In a sense there is something that could be called a Buddhist version of human dignity, since only when born as a human being does a creature have the possibility to reach salvation and to achieve nirvana. But this form of dignity does not entail the notion of an „untouchable nature.“ For a Buddhist any form of modern biotechnology including genetic enhancement is acceptable as long as it leads to a better human being and facilitates the process of rebirth, spiritual liberation and the attainment of nirvana. In his lecture to the assembly to the Society for Neuroscience in Washington D.C. in 2005, the Dalai Lama confirmed this open attitude of Buddhism towards modern sciences, including in relation to modern brain research.

Buddhism, in brief, will judge GEHB by measuring it with the yardstick of the following three criteria:

• What does the technological action do to the doer? Are the intentions behind it such that they cause good or bad karma for him or her?

• Is any harm done to any human or animal or is there benevolence (ahimsa) during the whole process? Is, for example, life endangered negligently?
• What use is the performed technological intervention for reaching spiritual elevation? Is nirvana closer following the technological intervention or is it as far away as it was before?

Buddhism, thus, offers the opportunity for a much differentiated ethical evaluation of genetic engineering in general, but with this, it also offers more opportunities for the abuse of philosophical viewpoints.

One of the most prominent recent examples of such abuse is the argumentation of Dr. Woo Suk Hwang, the head of a Korean research team. He presented the first cloned human embryo in an article published in the journal „Science“ on February 12, 2004 by saying: „I am a Buddhist, and I have no philosophical problem with cloning. And as you know, the basis of Buddhism is that life is recycled through reincarnation. In some way, I think therapeutic cloning restarts the circle of life...“ Schlieter, in an article published on website www.rub.de/kbe , cited here on December 20th, 2005, points out that this is a complete misinterpretation of Buddhist thinking and leaves it to the reader to suspect a purposeful act of an overambitious scientist or the error of a Buddhist layman. Most Buddhists regard any form of life as a reincarnation and therefore under the protection of the principle of ahimsa and would certainly also give this attribute to a human embryo in an early stage.

Interestingly – and this will give a boost to those who have always suspected that the claim of Buddhist views behind the striving towards human cloning is a fake - Dr. Woo Suk Hwang was caught cheating in connection with his famous experiment and the news of it traveled around the world in December 2005: (summarize)

„A scandal at the world’s foremost stem cell and cloning research laboratory has mushroomed in recent weeks, with Woo-Suk Hwang now admitting that his team’s much-heralded breakthrough, published in Science last June, was in fact fabricated. A senior researcher in Hwang’s laboratory reports that Hwang ordered a junior member of the research team to „fake the stem cell data“ and later to try to cover up the original fabrication. Hwang has also now admitted, despite earlier denials, that he violated ethical guidelines ... He admitted that two of his junior researchers had provided eggs for the research, and that he had denied it a year earlier in order, he said, to protect their privacy. In addition, Roh Sung-il, a prominent member of Hwang’s research team, conceded that he had paid 16 women the equivalent of $1,443 each out of his own pocket for their eggs for Hwang’s research
lab. The consent from the women signed said they had received „no financial payment.“ Only a few days earlier, Roh had admitted to using illegally traded eggs in his fertility clinic, despite a newly-enacted Korean bioethics law prohibiting the commercial sale of eggs and sperm. Three of the women interviewed on South Korean television said that they agreed to provide eggs because they were in dire financial straits; two of them said they had not been fully informed about the potential risks."

(Quote from http://www.genetics-and-society.org/ on December 20th, 2005)

3.3.3. Can the Hindu and Buddhist Views of Genetic Enhancement Offer the Basis for a Global Compromise?

With Western religion struggling hard with the advancements of modern biotechnology, some authors suggest that Hindu or Buddhist perspectives might provide a more pragmatic tool for making ethical judgments on these difficult and quickly evolving issues. They claim that perspectives are needed that are more able to reconcile philosophical and spiritual considerations with the pure materialistic utilitarian calculations of modern man, and that Hinduism and Buddhism might be able to provide them.

Professor Crawford, for example, states that „It is my belief that Hindu tradition can make a contribution to the difficult task of wrestling with the issues pertaining to altering nature.” (See Website http://www.llu.edu/llu/bioethics/update/update184.pdf (Quote from December 20th, 2005)

Likewise, Buddhism expert Jens Schlieter voices the hope that Buddhism will be able to make important contributions to the discussion about bioethics. He published an article on this topic in the Frankfurter Allgemeine Zeitung on January 3rd, 2003 (page 38): „To investigate Buddhist bioethics should be understood on the one hand as a contribution to comparative religious science that will cause reflection of Western paradigms. On the other hand, maybe there could be also an inherent contribution to finding the foundations of universal, cross-cultural bioethics.” (Translated by Christian Gruenler)

As much as this hope is understandable in the light of the conflict between allegedly „rigid-fundamentalist” views derived from the traditions of Judaism-Christianity-Islam on the one hand and allegedly „utilitarian” forces on
the other hand, there must be serious doubts that these hopes are very realistic for a number of reasons:

- Hinduism and Buddhism are extremely diverse within themselves. There is no such thing as a Hindu or a Buddhist view on practical issues, much less so than in Christianity and even lesser than in Islam. Says Buddhism expert Jens Schlieter: „One may add that the term „Buddhism” itself is a Western notion and was coined in around 1830 to denote different teachings, schools and traditions, which for their part seldom felt the need to unite in doxological perspectives. In effect, there is a wide range of Buddhist teachings in respect to the major schools of Theravāda, the dominant tradition in South-East Asian countries, and Mahāyāna Buddhism of Central and East Asia. This diversity can also be observed in bioethical reasoning.“ (Schlieter, page 6)

- Ancient texts of Buddhism and Hinduism give very few guidelines for developing general rules. In Buddhism in particular, most of the written rules concern the life of monks and nuns and are not intended to be the „raw material for laws.“ For example, while the Christian clergy is heavily involved in bioethics committees in Western countries, in Buddhist countries like Thailand this is not the case at all (see Schlieter page 18). In any case, both Buddhism and Hinduism tend to follow more casuistic approaches, which might be hard to swallow for Westerners are used to thinking in terms of principles.

- Hinduism and Buddhism have not yet dealt with the issues of genetic enhancement in any depth. There are very few publications about bioethics in general, most of them oriented towards medical ethics rather than towards bioethics (see for example the first book on „Buddhism and Bioethics“ by Pinit Ratankul of 1986). There are no conferences, no disputes and no heated discussions on television, no controversial newspaper articles like in the West.

In particular when it comes to the issue of GEHB, the seemingly moderate attitudes of Hindu and Buddhist scholars might be confronted with surprises that they might find quite uncomfortable. Put in a very simplified way, both Hinduism and Buddhism believe that human beings are able or even obligated to seek spiritual elevation that goes beyond their present empirical (= biological) existence. The reward will be a state of being that is free of pain and full of bliss. Both religions assume that the only way to getting there requires strong human effort. How would Hindu and Buddhist
scholars react to the prospect of GEHB technologies promising to achieve this state of painlessness and bliss by altering the structure of the brain? Would they then welcome the result or would they emphasize that without human effort the result is devaluated? That an „artificial nirvana“ is worthless and does not exist? Would they accept that GEHB is able to achieve this state of being at all? Would they reject the idea that one stroke of GEHB technology could achieve the same as many years of meditative effort? Would they detect a loss of meaning, very similar to the feeling that McKibben has, when realizing that most modern scientific evidence is not in line with the dualism between the physical brain and the spiritual existence?

At this point nobody can tell.

3.4. Religious Adherence, Public Opinion and Public Policy towards Genetic Enhancement

Ethical positions usually have a measurable effect when they are actively accepted by a majority. They are then measurable in opinion polls and, at least in liberal democracies, they usually also make it to the legislative institutions and somehow influence law making. For example, the death penalty is rejected ethically by a majority of people in Western Europe (roughly 2/3 of people in most polls) and, consequently, no Western European country practices it any more. In the United States, however, opinion polls show clearly that a majority is in favor of the death penalty and that is why it is still practiced there.

Even though this book is about listing ethical positions and not about determining their quantitative distribution, the figures on religious adherence and on the effects of this adherence on the perspectives concerning GEHB are just too important to ignore them completely. Christianity, Islam, Hinduism and Buddhism were chosen to be examined in more detail since they represent the four major world religions, as shown in the figure below (see next page):
To what extent does adherence to a religion determine ethical positions in general and on GEHB in particular? Do opinion polls or investigations of the legal situation in various countries reflect the differences between, say the Christian-Islamic view on the one hand and the Hindu-Buddhist view on the other hand, or is there no correlation visible?

In an earlier chapter (Market Forces), opinion polls were presented that do not deliver a clearly recognizable correlation between public opinion on GEHB and religious adherence by cultural region. So the picture derived from all these statistical data remains inconclusive.

Similarly, when investigating the outcome on the legislative side, it turns out that most countries simply have not taken any measures at all. As the following table shows, GEHB would be explicitly prohibited in only 27 of
192 countries if it were technologically feasible tomorrow due to huge loopholes in the relevant laws:

<table>
<thead>
<tr>
<th>Region</th>
<th>Countries</th>
<th>Reproductive Cloning</th>
<th>Research Cloning</th>
<th>Inheritable Genetic Modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Prohibited</td>
<td>Prohibited</td>
<td>Allowed</td>
</tr>
<tr>
<td>Africa</td>
<td>53</td>
<td>1</td>
<td>2%</td>
<td>1</td>
</tr>
<tr>
<td>Middle East</td>
<td>23</td>
<td>1</td>
<td>4%</td>
<td>0</td>
</tr>
<tr>
<td>South Asia/ East Asia/ Pacific</td>
<td>33</td>
<td>6</td>
<td>18%</td>
<td>3</td>
</tr>
<tr>
<td>Europe Eastern</td>
<td>24</td>
<td>14</td>
<td>58%</td>
<td>8</td>
</tr>
<tr>
<td>Europe Western</td>
<td>24</td>
<td>16</td>
<td>67%</td>
<td>13</td>
</tr>
<tr>
<td>Americas &amp; Caribbean</td>
<td>35</td>
<td>8</td>
<td>23%</td>
<td>5</td>
</tr>
<tr>
<td>WORLD</td>
<td>192</td>
<td>46</td>
<td>23%</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: Website of genetics-and-society.org status report 2004 copied from the website on December 21st, 2005

It is true that relatively many European Countries (17 out of 48) have taken legal action against germline engineering, but this may be due to the initiative of the European Council that will be described in more detail below. On the other hand, not even in a country with such a strong religious-fundamentalist movement as the United States is germline engineering explicitly prohibited by law.

The adherence.com website explains that in the end only self-identification is a feasible tool for producing viable statistics about religious adherence.
But this approach has as a consequence that the results should be looked at with great caution when drawing further conclusions on ethical attitudes and opinions based on religious adherence.

The main message behind these facts and figures is that religion most likely does not have a direct, explicit and exclusive influence on people’s ethical positions concerning GEHB.

- Religious people might have views on specific questions like GEHB that deviate considerably from the views derived from their religion or were issued by the clergy that represents this religion.
- Religions are very diverse within themselves. A multitude of views on GEHB exist within each of the large world religions with their various subgroups.
- And last but not least: There is a large and very diverse group of non-religious people in today’s world. This is, again, another very diverse group in itself reaching from deliberate and proactive atheists and agnostics to passive non-spiritually minded people. Non-religious people might have views derived from religious thoughts in a more indirect and subtle way because those thoughts are an integral part of the cultural heritage that non-religious people also grow up with. For example, the resistance against genetic engineering technologies and explicit laws prohibiting germ line engineering are probably strongest in Germany, while in the United States views have been somewhat more liberal up to now. This is surprising at first sight, since the power of Christianity is certainly stronger in the Unites Sates than in Germany, where some 40% of the German population has renounced any kind of membership in a Christian Church.

The lack of correlation between official positions of religious communities and attitudes towards GEHB is not proved by this listing, but the facts presented above point to the strong possibility that this correlation is grossly overestimated. This is probably due to the fact that the most active public communication on this subject has come from Christian anti-enhancement advocacy groups in the U.S. and Europe so far. But contrary to popular belief those activist groups seem to have only limited influence on public opinion and public legislation on germline engineering in spite of these intense public relations efforts. Most people seem to be either rather pragmatic or indifferent in their views.
In summary, at first sight it seems that, when it comes to the ethical evaluation of GEHB, other sources of ethical thinking probable have a greater weight in ethical decision-making than religious considerations.

Only Christianity still seems to struggle to some extent with the contradiction between the theological theorem that human beings were created in a separate act directly by God, who therefore has the monopoly for manipulating human DNA on the one hand, and by the fact that biomedical progress is advancing and nobody really wants it to stop on the other hand. But on the level of the individual Christian believer as well as on the level of the different sub segments of organized Christianity, there seems to be active intellectual musing going on to solve this contradiction by re-interpreting the fundamental theological theories such that they fit the progress that the mainstream of people desire. The following chapters will investigate in detail what the different choices are that lie behind theological barriers.
4. THE INTERNATIONAL SEARCH FOR COMMON GROUNDS OF HUMANITY’S VIEW OF GEHB:

4.1. The Struggle for International Law

4.1.1. Relevant International Declarations

Triggered by the advancements in genetic engineering like the birth of clone sheep dolly in 1996, the United Nations Organization got involved in the heated bioethics discussions on an international level. This resulted at first in the U.N. Universal Declaration on the Human Genome and Human Rights in 1998. Not surprisingly, this declaration does not mention GEHB directly but some of the key articles can be clearly interpreted as having a negative stand not only on GEHB but on genetic engineering of human beings in general:

"Article 1
The human genome underlies the fundamental unity of all members of the human family, as well as the recognition of their inherent dignity and diversity. In a symbolic sense, it is the heritage of humanity.

Article 2
a) Everyone has a right to respect for their dignity and for their rights regardless of their genetic characteristics.
b) … dignity makes it imperative not to reduce individuals to their genetic characteristics and to respect their uniqueness and diversity.

Article 5
a) Research, treatment or diagnosis affecting an individual’s genome shall be undertaken only after rigorous and prior assessment of the potential risks and benefits pertaining thereto and in accordance with any other requirement of national law.
b) In all cases, the prior, free and informed consent of the person concerned shall be obtained. If the latter is not in a position to consent, consent or authorization shall be obtained in the manner prescribed by law,
guided by the person’s best interest.”

Another U.N. Declaration in relation to genetics, the *United Nations Declaration on Human Cloning*, was adopted on March 8th, 2005 by the U.N. General Assembly and foresees that “… Member States are further called upon to adopt the measures necessary to prohibit the application of genetic engineering techniques that may be contrary to human dignity; ...”

The Council of Europe became heavily involved in the subject of germline engineering very early and the *Council of Europe Convention on Human Rights and Biomedicine* from 1997 is a little more specific than the United Nations documents in relation to the question of genetic enhancement:

„Art. 13 - Interventions on the human genome: An intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce any modification in the genome of any descendants.”

Article 14 of this Convention prohibits the selection of the future child’s sex which is a further indication of the clear will to prevent all „artificial” genetic modifications from happening.

According to Reiter (2004), the Parliamentary Assembly within the Council of Europe claimed as early as 1982 a human right to an „individual genome that has not been changed artificially.” Furthermore, there are plans to create a „New European Charter of Fundamental Rights” for the whole European Union, for which purpose a working group on bioethics has been established. In May 2000 this working group presented initial results of its work and it became apparent that it was focused mainly on the issue of „instrumentalization“ as the greatest danger to be taken into account. In its report it claimed that genetic manipulation, discrimination stemming from the knowledge of genetic characteristics of human individuals and merchandising of the human body and its parts are all possible causes of what the working group perceives as „instrumentalization.“ (see Schweidler, 2002, page 11).

Also on the level of the United Nations, more specifically within UNESCO, a draft for a specific *Declaration on Universal Norms on Bioethics* is being worked on. A draft of this declaration was presented to the delegates of 75 members countries on April 6th, 2005, affirming that the values on which any declaration, convention or other piece of international law on bioethics are based remain the concept of human rights and of human dignity:
"With regard to Article 4, all speakers recognized the importance of affirming human dignity, human rights and fundamental freedoms as a basic principle in the field of bioethics. Some delegates wished to include mention of the respect for human life, considering this to be the basis of human dignity and human rights."

(UNESCO document SHS/EST/05/CONF.203/5 Paris, 6 April 2005)

It is clear that such political declarations are inspired by the advancements in the area of biotechnology during the last few decades. In particular in the late 1990s cloning becoming an issue of debates in the media and the Human Genome Project gained great public attention. We may assume that it was this publicity forced such international organizations like the U.N. or the Council of Europe to take an official stance on this subject.

Many people ridicule international law and international declarations for their lack of enforcement bite. But the alternative solution of purely national legislation and policy making also has its limits in today’s reality as the following two case studies clearly show.

4.1.2. **Case Study One: Abortion Laws in Ireland as a Confirmation for the Argument „Only International Regulations will be Effective. “**

Predating this discussion and the latest declarations of international law are the international developments of biomedical ethics that will be dealt with in more detail below. Experiences made by national governments with the globalization of innovations in reproductive medicine also show the limits of national law.

One of the most educative examples in this respect is the dilemmas that the enforcement of abortion laws in Ireland has been creating for a few decades now. Even though abortion is illegal in Catholic Ireland, a pregnant woman can easily escape the reach of this national law by traveling to another country to have an abortion there, in particular to the neighboring United Kingdom where there are more liberal abortion laws. This became a major controversy and in the end led to a softening of the laws prohibiting abortion to the dismay of the conservatives within the Irish Catholic Church: „In response to the 1967 legalization of abortion in Britain and the subse-
quent rise in the numbers of Irish women traveling to Britain each year to  
obtain an abortion, anti-abortion groups in Ireland began to press for an  
explicit amendment to the Irish constitution banning abortion. In 1983, the  
Republic of Ireland by referendum amended the Constitution of Ireland to  
add in what became generally known as the 'Pro Life Amendment', which  
asserted that the fetus had an explicit right to life equal to that of its mother,  
with the Irish state guaranteeing to 'vindicate' that right.  

While the 'Pro-Life Amendment' established the principle of the 'right to life  
of the unborn, with due regard to the equal right to life of the mother' in  
Irish constitutional law, practical problems subsequently arose with its  
meaning. In 1992, a major controversy erupted over the issue of whether a  
suicidal minor who was a statutory rape victim, and who became pregnant,  
could leave Ireland for an abortion that is lawful in another country  
(Attorney General v. X, known as the 'X Case'). The Supreme Court inter-
preted the Pro-Life Amendment as giving a right to abortion in certain lim-
ited circumstances, in a judgment which came to be known as the 'X Case,'  
including when the mother's life was in danger. Court injunctions issued in  
1988 and 1990 under the 1983 amendment barred family planning groups  
and student groups from offering abortion counseling, information and aid  
in traveling to Britain to procure abortions. These injunctions grew increas-
ingly unpopular, particularly after the 'X case.' Questions were also raised  
as to whether the bans on access to information violated provisions in the  
Maastricht Treaty. Two constitutional amendments were subsequently  
added in 1993 that guaranteed the 'right to travel' and the 'right to informa-
tion' (a third amendment that would have defined when abortions could be  
considered legal was defeated). Due to questions about the constitutionality  
of the amendments, the changes did not come into force until 1995.”  
(Source: http://en.Wikipedia.org/wiki/Abortion_in_Ireland, December 28th,  
2005)  

Today, the UK-based Website www.thesite.or.uk is just one of many to offer  
a full service round trip and treatment package to Irish women who want to  
have an abortion for only 350 British Pounds.  

With this example in mind it is understandable that those forces that con-
sider a change of a human’s genome unethical want to make sure that all  
kinds of germline engineering are being banned by all declarations, conven-
tions, etc. on an international level, forcing all national governments to  
translate such an international point of view into national laws. So far this  
approach has had some success. It seems inconceivable at this point that a
declaration of the United Nations or of any other international organization could say something like this: „Modifications of the genetic endowment of an unborn human being are only permissible when it is in the best interest of this unborn human.”

On the other hand, there are a few reasons to doubt the long term viability and universality of that ban of germline engineering and consequently of GEHB after all:

- Not only GEHB but no form of germline engineering exists at this point for application on humans and the interest in precisely regulating something as futuristic in cumbersome international law making procedures is understandably low.

- The United Nations and similar international organizations tend to form a world of their own that can be quite detached from the realities on the national and local level. Delegates usually try to be diplomatic, pleasing, polite and as vague as possible as long as there are no economic or security interests of their nation at stake, while they just retreat to the realm of „national interests” as soon as real money and real power is the issue.

- Without ratification on the national level and without translation into national laws, any international piece of legislation will not be implemented sufficiently. Thus, the crucial political action is still happening on the national level with its own dynamics.

4.1.3. Case Study Two: The International „Ban“ of Human Cloning as a Model Case for the Development of International Viewpoints on Bioethical Issues

Cloning has happened many times since 1996 with animals. Ever since then, the creation of a human clone has been a favorite topic of fiction (e.g., Ken Follett’s „Third Twin“) it has also been a matter of public discussion in the media. The independent announcements of the Italian medical doctor Anti-nori in 2001 and of the „Raelians“ sect and their so-called „Clonaid“ institute in 2002 to create a human clone in the near future gave a special impetus to the discussion and may have triggered the rapid preparation of the anti-cloning declarations of the United Nations on the international level as well. What makes cloning so unethical for the initiators of all these declara-
tions can be categorized into two types of arguments: risk and human dignity:

- The risks involved are considerable - for sheep Dolly it took over 270 fertilized eggs and 29 pregnancies went wrong until Dolly was born. Sheep Dolly also had a lot of health problems and died early. There is probably a general agreement that it is immoral to even try to create a human clone under these circumstances. There would be a great risk of creating a large number of distorted human creatures in order to fulfill the desire to create a descendant of only one person for whatever reason that might be.

- Dignity arguments aim at the moral vanity of exactly that desire behind the cloning effort. Common arguments include: creating life without sexuality is „against nature,“ creating a copy of only one person reveals the narcissistic self-love of this person, creating a copy of another person devaluates the self-esteem of the clone, etc.

The problem is, however, that the creation of stem cells also requires, technically speaking, cloning in the form of stem cell research, which is a very promising field of medical science. (I hope I kept the original meaning of this last sentence) So as usual, the devil was – and still is - in the detail.

An article that appeared in the Washington Post on March 9th, 2005 – one day after the adoption of the U.N. Declaration on Human Cloning by the U.N. General Assembly – summarizes the conflicts and reactions of the international community:

„U.N. Backs Human Cloning Ban

By Colum Lynch

Washington Post Staff WriterWednesday, March 9, 2005; Page A15

United Nations, March 8 -- The U.N. General Assembly adopted a declaration Tuesday that calls on governments to ban all forms of human cloning that are „incompatible with human dignity and the protection of human life.‟

The U.S.-backed resolution, which passed by a vote of 84 to 34 with 37 abstentions, is not legally binding. The vote ended four years of highly contentious debate toward a legally binding treaty -- an effort that unraveled when the participants could not agree. The dispute pitted the United States and conservative Catholic countries, which favor a total ban,
against many European, Asian and other governments, which want a partial ban that would permit the cloning of human embryos for stem cell research. Virtually all U.N. members agree that the cloning of humans should be banned.

Sichan Siv, the U.S. delegate, welcomed the action by the 191-member General Assembly in a brief statement. He referred to a previous U.S. statement praising the declaration for opposing scientific efforts to „take advantage of some, vulnerable lives for the benefit of others.“ Britain, Belgium, China and other countries that support „therapeutic cloning“ -- the cloning of human embryos in medical research aimed at finding cures for diseases -- said they will not honor the declaration.

„The United Kingdom is a strong supporter of therapeutic cloning research because it has the potential to revolutionize medicine in this century in the way that antibiotics did in the last,“ said Emyr Jones Parry, Britain’s U.N. ambassador.

Diplomats and experts on cloning said that the language in Tuesday’s declaration was ambiguous and that its meaning would be disputed. For example, it is unclear whether therapeutic cloning is considered „incompatible with human dignity.“ Still, a number of U.S. and European medical and scientific groups expressed dismay over Tuesday’s vote, saying it could undercut medical research aimed at curing a host of diseases, including Parkinson’s, Alzheimer’s and diabetes. The declaration could „halt or severely delay progress in the development of very important therapeutic treatments of major public health diseases,“ said Alan I. Leshner, chief executive of the American Association for the Advancement of Science. But those backing the total ban said Tuesday’s action showed that support is growing. „This declaration shows once and for all this is not all about the religious right,“ said William B. Hurlbut, a Stanford University ethicist who serves on President Bush’s Council on Bioethics. „A decent society doesn’t build the foundations of its biomedical science on the creation and destruction of human embryos."

(Source: www.washingtonpost.com/wp-dyn/articles/A18205-2005Mar8.html)

To complete the picture of the actual reality, however, it is quite interesting to read Schlieter’s analytical report of how the government of Thailand – one of those countries voting in favor of the UN declaration to ban human cloning – handles the issue on a national level in day-to-day reality of government work (see Schlieter, 2006, pp. 17-19):
At present, no central state authority is officially responsible for the ethical aspects of cloning research. However, different institutions have presented proposals for legal and ethical regulation: First, there are ratified guidelines by the Medical Council of Thailand, but these are binding only for physicians in hospitals and scientists in governmental institutions. Second, there are ministerial decrees of the Ministry of Science, Technology and Environment, but they have not been ratified by parliament, and thus have a limited scope of application. Third, there are a number of initiatives of which the most prominent is that of the Bioethics Advisory Committee of the National Health Foundation of Thailand (NHF) in cooperation with the National Centre for Genetic Engineering and Biotechnology (BIOTEC). But, again, their recommendations are not yet enforced by law. And there are further Research Ethic Committees in the Universities. The Bioethics Advisory Committee tries to implement international standards, for example, the WHO/UNESCO guidelines and declarations and has organized hearings, at which Buddhist positions have also been presented. In August 2001 Pramual Viruttamasen, Director General of the Medical Council of Thailand, announced newly adjusted ethical guidelines: In order to prevent controversial embryo research, medical personnel should limit their research on surplus embryos from IVF procedures up to the 14th day, assuming that the ability of the nervous system to process sensations or thought has not yet developed. The decision of a sub-committee of the Medical Council also backed cloning research for just one purpose, namely, that of breeding organs. Pramual said: „Even though the sub-committee unanimously agreed not to allow human cloning for reproductive purposes in our country, the majority of Committee [members] have expressed their support for that kind of cloning [organ cloning]. That is the basis for backing stem cell research.” But the scope and meaning of the decision seemed to be less than clear. In December 2001 Prof. Anek Areepak, chair of the Human Research Ethics Club of Thailand, declared that the Ministry of Health had prepared to draft a bill to ban human cloning. It enforced more or less the above regulations of a permissive approach, partly adapting British regulations, and it was enacted in 2002. During my visit to Bangkok in August 2003, I was told that all companies wishing to do stem cell researches now have to submit an application to the Ministry of Health and the BIOTEC. Since there have been no applications for permission to do research on human cloning, there has so far been no rejection. But one interview partner of the NHF told me that it is most difficult for the few specialists in the Ministry to check whether research is being done in the proposed way or not. In a „National Meeting on
Bioethics and Human Genetics” held on June 25-26, 2001 – the first of its kind, organized by the NHF and BIOTEC – arguments were exchanged concerning the legal situation, possible genetic discrimination, and the ELSI program. On the international level, however, the Thai delegate at the UN Legal Committee for the Possible Convention Draft against Human Cloning, Manasvi Srisodapol (Minister Counselor), voted in favor of a ban on reproductive cloning on the one hand, and the formulation of ‘appropriate guidelines’ for therapeutic cloning on the other hand. This position, he said, was consistent with the position taken by the BIOTEC/NHF committee in his home country.”

The international discussion about cloning could very well be a model case for GEHB once it becomes more relevant after some advancement in technological development. If we accept that thought, then the following conclusion could be derived from the model case of the international ban of human cloning:

- The proponents of GEHB will argue not by citing application examples that are clearly enhancements, but with application examples that are clearly treatment. Who could possibly be against finding treatments against Alzheimer’s or Parkinson’s just because this involves the manipulation of an embryo in the phase of just a few cells or even before the actual fertilization of the egg cell?

- Those opposing will argue that this would almost inevitably open the door for further steps and, thus, one should rather design laws following the principle of „beware of the beginnings.”

- In the end, the treatment argument might succeed in avoiding a total and well-enforced international ban from materializing. This could either be the result of an open disagreement on banning or not banning GEHB, but there could also be some agreement by lip service that is then implemented poorly due to either government inefficiency or due to a lack of philosophical concern.
4.2. Human Rights, Human Dignity and the Claim to their Universality

4.2.1. The Viewpoint of the Legislative and Judicative Establishment in Germany

Human dignity results in human rights and human rights are probably the most important basis for legislation in all countries with liberal democracies. The United Nations Declaration of Human Rights of 1948 formalized the principles and the concept of human rights and human dignity and strengthened its formal status. Human dignity and human rights, thus, are quoted by many Western sources as an important basis for reaching bioethical decisions.

Especially in Germany, human dignity, mentioned in Article I of the Constitution, is generally interpreted in a very rigid and strict way. This is in part due to the very negative history associated with allowing a lax attitude towards these principles during the Nazi period. Paul Kirchhoff, one of the judges of the „Bundesverfassungsgericht“ (the German Supreme Court) from 1987 to 1999, derives very clear standards concerning genetic enhancement directly from the constitutional principal of human dignity in a 2002 article on „Genetics and Freedom of Science“ (all the following texts are translations by Christian Grünler):

„Article 1 GG (= the German Constitution) ... requests respect for a human being in his existence and his being-as- he-is and expects that proper and reliable mechanisms of protection are installed. ... (page 14)

*If we grasp reality intelligently and apply the constitutional rights to all areas of the individual life, then the protection is already valid for the fertilized egg in which the genetic coding is included and with which, consequently, individuality begins. ...*(page 21)

Should the thought of breeding humans, cloning humans and the manipulative creation of a new species – like chimaeras and hybrids – become legally relevant, then the protection of the right to live and to be physically unharmed has to be extended for humans’ sake to the categorical ban (of genetic modification) even before the stage of the fertilized egg. ... (page 23)"
Kirchhoff’s views are quite common amongst the political class in Germany of today and have resulted in some of the world’s most rigid legislation concerning the status of embryos (Embryonenschutzgesetz). This is much – to the dismay of the scientific community, which has been forced to outsource substantial parts of modern biotech research (like stem cell research) to facilities abroad. The fear is that softening the application of the principles would automatically bring Germany onto the slippery slope of Nazi-style eugenics again. To quote Kirchhoff again:

„If we denied the embryo the protection of human dignity because it is incapable of making rational, self-conscious decisions, then other individuals with the same characteristic must also be bared of human dignity – babies or mentally ill, for example.” (page 22)

Kirchhoff says about PID (pre-implantation diagnostics): „The knowledge resulting from the diagnosis, could lead to „trial fertilizations,” this could open „breeding-opportunities” and could cause a „selection pressure” …” (page 31).

Germany – again, a country where around 40% of the population proclaim to be non-religious - has today probably the most rigid laws in the world to protect embryos from any kind of manipulation. It and might also be the country where attitudes opposing the application of genetic engineering technologies in general are more strongly felt than anywhere else. It is interesting that a man like Kirchhoff finds it necessary and unproblematic, in spite of the strong secular feelings of large parts of the population, to point out that the human dignity paradigm of the German constitution is in the very end religion-based:

„The basic value of our constitution, the protection of human dignity for all existing human life, has its roots in the Christian belief that man was created in the image of God (imago dei) … (page 11).”

Even though Kirchhoff or any of his lawyer colleagues do not specifically mention any futuristic GEHB technologies, it is quite clear what they would think of it if they were directly asked about it. Asking a representative of the German Constitutional Court of today to give a legal and ethical assessment specifically about GEHB would be like asking a representative of the Iranian clergy to give an assessment on a specific kind of whiskey.

It must be added that the headline of this chapter and its underlying tone might lead to the wrong impression. I believe that in the bio-political debate in Germany of the early 21st century, there is an upper crust of functionaries
and bureaucrats at work who dominate the decision-making and have little connection to the common masses and their thinking. The term „legislative and judicative establishment” might sound like that. But the reality is that I do not have sufficient and reliable data on what the common masses think and, thus, do not want to speculate about it either. All I wanted to say by choosing the term „establishment“ is that no mainstream politician and no judge of today’s Germany can really afford to deviate from a complete and convincing condemnation of any kind of enhancement or genetic modification of human embryos due to the special historic experience Germany made with eugenics during the Nazi period. I do not want to speculate about the deepness and profoundness of this attitude but simply report about it.

4.2.2. Religious Roots of Human Dignity and Human Rights

The views of the German Constitutional Court are widely shared by U.S. author Leon Kass, who was appointed by George W. Bush to chair the President’s Council on Bioethics from 2001-2005. But Leon Kass argues even more than Kirchhoff on the basis of human dignity being derived from religion. The reference to religious roots becomes in particular clear in the chapter with the headline „What about Human Dignity?” in Kass’s 2002 book Life, Liberty and the Defense of Dignity:

„ … Practitioners of prenatal diagnosis, working today with but a fraction of the information soon to be available from the Human Genome Project, already screen for a long list of genetic diseases and abnormalities, from Down syndrome to dwarfism. Possession of any of these defects, they believe, renders a prospective child unworthy of life. … Determining who shall live and who shall die – on the basis of genetic merit – is a Godlike power already wielded by genetic medicine. This power will only grow. …” (page 130)

„ … According to Genesis, God, in His creating, looked at His creatures and saw that they were good – intact, complete, well-working wholes, true to the spoken idea that guided their creation. What standards will guide the genetic engineer? …” (page 131)
“... Hidden in all this avoidance of evil is nothing less than the quasi-messianic goal of a painless, suffering-free and, finally immortal existence. ...”

Who could blame Leon Kass for making that connection between religion and human dignity, when it is even explicitly mentioned in the United States Declaration of Independence: “... all men are created equal, ... they are endowed by their Creator with certain unalienable rights.”

The problem is that if the source of human dignity and human rights is a religious one, then their universality would be in question since there is no such thing as a universal religion as we have seen. This would mean that the current rejection of germline engineering applied to humans on that basis might be only a particular political reaction that would be based neither on social consensus nor on supra-religious paradigms.

The concept of human dignity and human rights as the universal basis of what is right or wrong is not undisputed in general and was discussed in particular with great vigor during the second half of the 20th century. Is the concept of human dignity and of human rights just a tool of the old Christian missionary in a new and modern disguise? Are human dignity and human rights just weapons in the psychological warfare of the West against undesired foreign governments during the period of the Cold War in the second half of the 20th century? Or are they means of a continuation of the cultural imperialism as so many Third World dictators have claimed? Are they a common value basis that every politician who is involved in international politics appreciates as such? Or is it the value base of the Christian-Western culture that the politicians of other cultures just follow half-heartedly in order to avoid a clash of culture with the rich and superior countries of the Western world?

Many books and many thousands of pages have been written about these questions and many hours of talk shows and TV interviews have dealt with this topic during the last five decades. This cannot be the place to find a final word on the matter and it is not the intention of this book to even make an attempt to summarize the discussion. But undoubtedly the questions related to human dignity and human rights are highly relevant for the issue of ethical positions of GEHB:

- If the current rejection of genetic enhancement of human beings by the international community were derived from the belief of genetic dispositions being given by a Creator, then it would be an issue predominantly
of the Judeo-Christian-Islamic culture. There would be an imminent risk of this rejection vanishing very quickly as soon as strong teleological-utilitarian-practical-economical advantages of GEHB became visible.

- If, however, the current rejection of the genetic enhancement of human beings were derived from the adherence to other profound values that are so universal that they also are truly accepted and are truly applicable also in other belief systems – including all the non-religious and Asian belief systems – then GEHB would never be accepted as ethical.

As we have seen above with the example of the Irish anti-abortion laws, in a global economy the chances of keeping GEHB under control once it exists would be very small if the first option were true. This forces us to investigate the issue of human dignity and human rights somewhat further. According to the Wikipedia encyclopedia website, human dignity and human rights are defined as follows:

„Dignity in humans involves the earning or the expectation of personal respect or of esteem. To esteem persons or things means to assign to them a high value. Esteem for persons or things assess their value as high. Respect can refer to the objective, unbiased consideration and regard for rights, values, beliefs and property. Kant’s categorical imperative, as well as expressing a common understanding of civilization, incorporates the concept of respect. „

„Human rights refers to the concept of human beings as having universal rights, or status, regardless of legal jurisdiction, and likewise other localizing factors, such as ethnicity and nationality. For many, the concept of „human rights“ is based in religious principles, or else is otherwise directly related to them. However, because a formal concept of human rights has not been universally accepted, the term has some degree of variance between its use in different local jurisdictions —difference in both meaningful substance as well as in protocols for and styles of application. … Within particular societies, „human rights“ refers to standards of behavior as accepted within their respective legal systems regarding 1) the well being of individuals, 2) the freedom and autonomy of individuals, and 3) the representation of the human interest in government. … In the Western political tradition, human rights are held to be „inalienable“and to belong to all humans. „

(The quotes above are taken from the Wikipedia encyclopedia on December 15th, 2005; http://www.answers.com/library/Wikipedia)
Intelligent proponents of the human dignity and human rights idea realize the potential long term danger of those principles not being universal enough because of their religious roots. They therefore insist on them being directly connected to „human nature.” There are many authors using the argument that the universality of human dignity and human rights come directly human nature. Since there is nothing more universal than human nature this is supposedly a killer argument against all the suspicions listed above, but also against the view of human dignity and human rights as a result of social consensus.

Francis Fukuyama is one of those authors using this argument. He elaborates on it in his 2002 book *Our Posthuman Future*, primarily in the chapters on „Human Rights” and „Human Dignity”, pp. 105-177). Fukuyama claims that there are three possible sources of human dignity and of human rights, namely a creator, social consensus or human nature. While he finds social consensus not reliable enough to base fundamental universal laws on (see page 113), he declares that there is nothing wrong with the assumption of religious roots as long as they are not in contradiction with the real roots in human nature. He ignores in this particular text the fact that many philosophers (Habermas being one of the important ones) make a distinction between a consensus based on conformism, power relations or social desirability and consensus based on arguments. He instead goes through considerable effort to try to define human nature. We will come back to that later when we take a closer look at the notion of „human nature.”

Fukuyama points to the fact that human rights must be seen as independent from religion because they came into existence for the very purpose of distinguishing rights from religious assertions. He refers to Immanuel Kant as one of the main proponents of human dignity in philosophy. Therefore, according to Kant, human beings have to be treated always as ends in themselves and not merely as means to an end. It was out of this secular argumentation that the European Council’s worries grew about the „instrumentalization” of human beings in the process of genetic enhancement during the last two decades.

But Fukuyama also claims that it could be that religion had just been replaced by „habit“ in order to find common grounds and that even Kant’s universally human view ultimately might rest in his Protestant worldview. Fukuyama goes on to quote Max Weber’s cynical word of „The ghost of dead religious beliefs” to make this point. If this is true, then the argument that human dignity and human rights are a specific feature of the Judeo-
Christian-Islamic culture would still be valid, and the underlying principles for rejecting GEHB would have been created by religion and could therefore not be universal. Even if it is not the Pope or an Imam speaking out against GEHB, but people like Kass and Kirchhoff instead - the fact that they do not belong to any religious clergy would not automatically increase their degree of universality.

Besides, there are numerous critics of the concept of human dignity and human rights even within the realm of the Western culture who mainly argue against this concept because it is too „wishy-washy” and fails to give clear and indisputable guidelines once there are concrete questions on the table. This kind of criticism is not a new phenomenon, but has accompanied the human rights discussion literally for centuries. In his classical book „Philosophical Ethics” Tom Beauchamp describes (on page 267) that the „framers of the US Declaration of Independence held that the rights to life, liberty and the pursuit of happiness form the core of natural rights. Authors of the French Declaration added rights to security and resistance to oppression, whereas Thomas Hobbes had focused first and foremost on the right of self-preservation. These authors shared many political goals in common but their list of rights range over considerable territory.”

There is a red line stretching from Jeremy Bentham’s famous assessment of natural human rights to be „nonsense on stilts” to the following quote of James Watson, co-discoverer of the DNA, Nobel Prize laureate and enfant terrible of international bioethics: „I’d like to give up saying rights or sanctity. Instead, say that humans have needs, and we should try, as a social species, to respond to human needs – like food or education or health – and that’s the way it works. To try and give it more meaning than it deserves in some quasi-mystical way is for Steven Spielberg or somebody like that. It’s just plain aura, up in the sky – I mean, it’s crap.” (See Fukuyama, 2002, page 105)

Even if you do not like the degree of profoundness of the criticism or the choice of the words, there are definitely weaknesses in the human dignity/human rights concept’s ability to provide unquestionable guidelines for daily life. Day-to-day-politics and modern biomedical advancement are definitely one area that delivers one challenge after the other to the human rights philosophers of this world:

While we are all unified in our rejection of slavery and in our demand of non-discrimination based on racial traits or sex, the meaning of human dig-
nity at the very beginning and very end of human life is not universally understood at all. Topics like abortion, in vitro fertilization, prenatal diagnosis, euthanasia, the rights of debilitated and incapacitated senior patients, the rights of somebody who is a brain dead coma-patient and the rights of their family members, all these are hot issues in Western countries because it is not clear what the human dignity-paradigm really means for these cases. The very general wording of human or natural rights declarations itself is a problem for deriving concrete action guidelines from them. This is best illustrated by two examples (Fukuyama, 2002, pp. 107 and 122) where proponents of genetic enhancement deduce a right to do so from generally accepted human rights principles.

Modern brain research leads to more and more questions concerning Kant’s assumption of humans being mainly defined by their „free will.” The concept of consciousness has become a more sophisticated one with varied scientific views coming to different results. To quote Fukuyama on this subject with the very exotic example of the question whether there are rights of very intelligent computers: „... there are many enthusiasts who are convinced that ... we are on the verge of a breakthrough in which mechanical computers will achieve consciousness. There have been conferences and earnest discussions devoted to the question of whether it would be moral to turn off such a machine if and when this breakthrough occurs, and whether we would need to assign rights to conscious machines. ... By consciousness I mean subjective mental states: not just the thoughts and images that appear to you as you are reading this page but also the sensations, feelings and emotions that you experience...” (Fukuyama, 2002, page 166). The movie „I robot” based on a novel by Isaac Asimov illustrates in a Hollywood fashion how this ethical problem might evolve.

4.2.3. The „Personhood Concept” of Peter Singer and James Hughes and others as an Alternative to what they call „Human Racism”

As strange and disturbing as these developments may seem to the common citizen of a Western society who proudly looks back to some 250 years of fighting for freedom and for equality rights, there are authors who have already ventured into new areas that would to a great extent devalue and replace the old concept of human dignity and human rights as the most basic paradigms. If human dignity and human rights were a teleological concept
and the avoidance of suffering were the issue, then the inherent anthropo-
centrism would also be completely inappropriate, they say. This very posi-
tion is held, for example, by philosopher Peter Singer who claims that natu-
ral rights should be awarded to those who can make proper use of them. 
This means not only humans, but also higher developed animals while ex-
cluding embryos or coma patients. Besides, modern ideas of Darwinian ev-
olutionary development increasingly challenge the crystal clear separation 
between animals and human beings underlying the idea of human dignity. 

There are also authors who challenge the concept of sanctity of humans. 
One of those authors is James Hughes, secretary general of the „World 
Transhumanist Organization“ and author of the 2005 book „Citizen Cy-
borg.“ In this book Hughes argues vehemently that it is acceptable to assign 
rights to living creatures, but that the current „human-racisms“ should 
be replaced by the concept of „personhood.“ Hughes openly admits that „....
there is no agreement about what personhood entails.“ And he adds: „The 
most minimal threshold for personhood is something like 'conscious beings, 
aware of themselves, with intent and purposes over time.' In addition to 
consciousness, self-awareness and self-motivated activity, philosopher 
Mary Anne Warren adds 'reasoning' and 'the capacity to communicate.' 
Other personhood theorists, such as Tristam Englehardt, Joseph Fletcher 
and Joel Feinberg, also add 'the ability to care about the opinions of others' 
...“(Hughes, 2005, page 222). 

For a radical personhood theorist this would mean a completely new world 
of bioethical thinking. In particular in respect to the owner categories of dif-
ferent rights levels as the following table shows:

<table>
<thead>
<tr>
<th>Example Types of Life</th>
<th>Consciousness</th>
<th>Rights Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Humans, enhanced or unenhanced and their cognitive Equals</td>
<td>Mature Personhood, with Reason</td>
<td>Full Citizen; Right and Ability to Self-Determination, to Vote and to Make Contracts</td>
</tr>
<tr>
<td>Human Children</td>
<td>Personhood (Self-Awareness)</td>
<td>Disabled Citizens</td>
</tr>
<tr>
<td>Demented and Mentally Disabled Human Adults</td>
<td></td>
<td>Right to Life and to Assistance to Achieve Full Self-Determination</td>
</tr>
<tr>
<td>Great Apes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example Types of Life</td>
<td>Consciousness</td>
<td>Rights Status</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Most Animals</td>
<td>Sentience (Pleasure and Pain)</td>
<td>Sentient property</td>
</tr>
<tr>
<td>Fetuses</td>
<td></td>
<td>Right Not to Suffer Unnecessarily</td>
</tr>
<tr>
<td>Permanently Vegetative Humans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain-Dead Humans; Embryos;</td>
<td>Not Sentient</td>
<td>Property</td>
</tr>
<tr>
<td>Plants; Toasters</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The continuum of Consciousness and Rights (copied from Hughes, 2005, page 224)*

Hughes comments on this table as follows:

- „Full citizens are persons who fulfill all of Warren’s conditions such as adult humans, posthumans (at least the kind that most of us would choose to become), uplifted animals and possibly some future human-level machine minds."

- „Things that are not (full) citizens are necessarily property and their affairs are determined by laws controlling what people can do with different kinds of property. Not all property can be bought or sold and you can’t always dispose of property any way you like.”

- „Things that can feel pleasure and pain oblige us to ensure that they not be caused unnecessary suffering. Sentient property includes fetuses, most animals and permanently unconscious humans who are still sensible. Simple biological property, which can’t feel pain, would include things like embryos and corpses.”

- „…. I think we have the same obligation to uplift ’disabled’ animal citizens that we have to disabled human citizens.”

No further comment is needed to show what explosive power this contains for the existing concept of drawing the line between humans and the rest of the world. There are a lot of questions that come to mind when reading about the personhood concept. For example, does it really make sense for ethical theory making to put toasters (which will always remain property) and embryos (which will grow into persons if they are allowed to) into the same category. Or on what grounds is the right to life not given to other animals but only to those who are self-aware. Or has it really been suffi-
ciently scientifically proven that great apes are self-aware and that fetuses are sentient but not embryos? And so forth.

But all these questions about the inner logic of this new overall viewpoint are not really the major issue here. The important point is that the existing, traditional paradigms of human dignity and human rights are not convincing enough as a basis to derive bioethical solutions for many thinkers of the late 20th and the early 21st century. It might have been great achievement to claim a certain minimal level of freedom, respect and treatment for all members of the human species from the feudal aristocrats of the 18th century and then from the ruthless capitalists of the 19th century. But for the complicated questions surrounding near-humans, humans-to-be, ex-humans, brain-dead humans, human-like creatures and potentially „post-humans“ and all of their affected body parts that might be treated, handled, created, modified, sold, replaced, destroyed and disposed of in the bio-labs of the 21st century they just no longer seem to be suitable and sophisticated enough. Could theories like the one on personhood ever have appeared if there were no pressing vacuum of ethical paradigms to be filled?

In addition, it seems that concerning the status of embryos a large percentage of the world society is no longer able to follow the old elite of the legal establishment of Western countries. This means that they no longer share the opinion that a microscopic clump of matter consisting of three to three hundred cells should be treated like a human being with a full right to life. Many people do not share the view that embryos are untouchable and with the same rights that we would give to any adult person, i.e., that they cannot be used, sold, destroyed, bred, etc. The middle class, well educated middle class person in Europe and in North America probably has difficulties following the esoteric thoughts on non-identity in case of germline modification (i.e., the argument that in reality a person gets killed while another person emerges instead of the idea that one person is being changed; see Ossorio in Chapman, 2003, pp. 253-269) that is an outflow of a quite radical concept that declares embryos to be human beings with the full scope of inherent legal and moral consequences. This middle class, well educated person might be confused by the argumentation about whether prenatal selection should count as abortion or not, whether germline intervention is better or worse than PGD and about discussions concerning the status of the embryo in general. How, if and when GEHB will emerge will eventually also depend on how the general public will cope with these questions.
Besides, there exist also quite eccentric and radical variations of the human rights idea in connection with the debate about germline modification that pinpoint the limits of the human rights approach to answer ethical questions on GEHB even more clearly.

4.2.4. Two Examples of Surprising Interpretations of Human Rights in Connection with Human Germline Engineering

Radical Views of the Disabled Rights Movement

One of the uncontested human rights is that of non-discrimination on the basis of race, skin color, sexual orientation or gender. Ever since human rights have made it to be the arena of international politics, many other subgroups of society have claimed what they perceive to be their rights, including the community of disabled. But the emphasis on rights and self-esteem has also always led certain factions in all those subgroups to go beyond non-discrimination. They also develop pride and identity for their specific features to an extent that results in quite radical ideas. This also happened within a segment of the disabled rights movement. Some of them started not to only claim that society should provide an infrastructure to avoid exclusion of the disabled from mainstream society like access for wheel chairs, etc. They also started to claim that there is a right for disabled parents to form their children such that they would be part of their particular community. Even more extreme, they claimed that any attempts to eliminate the disability would be a mutilation of the family identity. In a famous case, a deaf person denied his son hearing aids even though this well-known technology would have given his son the ability to hear. The reasoning behind this seemingly strange behavior was that the son then would be confronted „with all the noise of the non-deaf world“ and that being deaf is part of the family’s identity just like having black skin is part of a person’s identity that has African ancestors. A majority of people would probably follow Prof. Bonnie Steinbock in her assessment that „In my opinion this is an extreme and unacceptable position. … The reason is that disability limits people, even in a perfectly accommodating society.“ (Chapman & Frankel, 203, page 183)
This is also acknowledged by most moderate disability rights advocates and most people would probably sympathize with Christopher Reeve in his desire to walk again after he had become a quadriplegic after a riding accident. However, this sympathy also has its limits when it comes to genetic engineering. Reeve was fiercely criticized for funding stem cell research through his foundation until he died in 2004.

There are many historic reasons why disability rights and genetic engineering, PGD, and IVF just do not go together well in the minds of many people. This is demonstrated very clearly by the following quote: "... We are now moving rapidly into an age of saying there are lives that are not worth living and we either prevent them by abortion if they are discovered antenatally, or we are now moving into the hi-tech way of pre-conceptional prevention." And this is "... the Nazification of medicine." (See Richard Nicholson, editor of the Bulletin of Medical Ethics, quoted by Steinbock in Chapman & Frankel, 2003, p. 182)

Is there a Human Right to Apply GEHB Technologies?

Another peculiar sub-segment of the wide array of rights that are proclaimed in today’s rights-driven political arena is the libertarian claim that parents have the right to use genetic enhancement once it is available. Parents' rights and their limits will be a topic of a later chapter, so at this point the mere mention of the claim to a "human right for genetic enhancement" shall suffice at this point.

Interestingly, it is a side arm of the feminist movement that promotes the thought of genetic enhancement to be included in the catalogue of reproductive rights and, thus, be part of the human rights realm. "Why should we allow abortion and other behavior and not allow GEHB as long as it is done in the perceived best interest of the child?" – is the common sense approach to formulating this kind of human right. James Hughes points out: "If a woman has a right to kill her fetus or poison it with alcohol (or badly harm it with nicotine and without having to fear any punishment as a consequence – addition by Christian Gruenler) that would certainly seem to cover a right to improve her genome and then reproduce, or to clone herself, or perform genetic therapies on her unborn child for its benefit. If women should have the right to choose the father of their child, with his attendant characteristics, then they should be allowed the right to choose those characteristics from a catalogue." (Hughes, 2004, pp. 137-138)
There are of course many other authors who would fiercely disagree with this interpretation. Nevertheless, the quote shows that the concept of human rights is open for a wide range of interpretations – too wide maybe. Sarcastically, James Hughes quotes Marcy Darnovsky of the anti-genetic enhancement Centre for Genetics and Society to point to this weakness of the argumentation base: „It will take focused effort to make it clear that altering the genes of one’s children is not among the reproductive rights for which so many women and women’s organizations have struggled.”

4.2.5. Consciousness, Free Will, Authenticity and Identity

When people are asked what is typical for humans then the terms „consciousness” and „free will” will appear with a high likelihood. The philosophical discussion about these terms is ancient and what consciousness means exactly and whether human beings really do have free will have been discussed for many centuries. During the last three decades modern brain research has added an interesting flavor to this discussion without being able to bring an end to it. Very typical for the stage we are in is the discussion about the experiment of Benjamin Libet in 1979. Libet measured the point in time when a person realized the desire to act in a certain way and the point in time when the brain signaled an „unconscious impulse” to act this way. He found that the impulse appeared a fraction of a second before the conscious desire and concluded that maybe there is no such thing as free will in human beings. It is worth it to look at the details of the empirical set-up and about the description of attempts of other researchers to repeat the experiment in order to come to a complete picture of the status of the neuroscientific discussion on the question of free will. To make it short since there is not enough space here in this book: The picture is still inconclusive and there is still no end to this discussion in sight. Not only was the variance of time span between impulse and realized desire very great, sometimes the desire was first and the impulse second. Besides, it is completely unclear whether the impulses measured by EEG are really unconscious and contrary to the idea of free will. For example, it could very well be that the impulse is only a result of long lasting thinking processes that created neuronal networks by brain activities that happened completely independent of the any external influence. If those neuronal networks that were created by free will activities within the brain are then triggered by the external event
that they were designed for – for example the cool face when attacked with
an insult by somebody else – is this impulse-based action then really an act
that is lacking free will?

Benjamin Libet’s experiment and what followed afterwards is insofar highly
relevant for the discussion about GEHB because one of the claims of oppo-
nents of GEHB is that it will deprive human beings of their free will and
conscious state of mind, which is part of their human identity. Enhanced
persons, so goes the argument, are not their true selves and are not „authen-
tic” and have, thus, been deprived of their human dignity and human right
to be who they really are. Just like drug addicts are not their true selves and
have lost all their dignity in the later stage of their addiction, enhanced per-
sons are de-humanized in their stage of being a puppet of the enhancer.

It seems that the works of fiction modeled after Brave New World are the
main guidance behind this line of argumentation and there is a lot of quite
old-fashioned speculation in the background. Admittedly, this speculation
cannot be countered without some degree of counter-speculation. For ex-
ample, it seems highly unlikely today that it is even possible to program
somebody by intervening into a person’s genes alone no matter what the in-
tervention is (see above). Besides, most parents will not even have the inten-
tion to produce a person with less free will or less „authenticity,” but would
rather have the intention to increase alertness, awareness, intelligence, etc. –
all those features that are typically associated with more rather than less
consciousness and free will. But even when the emotional status is en-
hanced and, for example the musical intuition or the ability to withstand
psychological blows is increased „artificially” – is that really less „authen-
tic”? Would parents really have deprived the enhanced child of a natural
identity that the child would value more than the unnatural enhancement?

And if the answer to this is yes: what would this mean for the moral guid-
ing principles for all non-genetic enhancement techniques – for elite educa-
tion for example? Wouldn’t that mean that the best interest of the child as
perceived by the parents is irrelevant and that instead of imposing anything
we have to search for the true identity and the free will decision of the child
at all costs just like the Summerhill School in Leiston, UK attempts to do? If
we rejected „artificial” brain enhancement – wouldn’t that mean that we
would have to close down elite schools like Harvard, Princeton, INSEAD,
Oxford and Cambridge immediately – this way we would even be able to
increase the equality of opportunities with regards to brain enhancement
which is another worry of the opponents of GEHB. These thoughts about
the practical implications of philosophical considerations seem far fetched, but show quite clearly that it might be a philosophical trap to create a link between the personhood discussion that is derived from the concept of human rights and human dignity on the one hand and the question whether genetic enhancement is good or bad on the other hand.

How easy it is to fall into the personhood discussion trap when talking about human enhancement is shown by the writings of the famous German philosopher Juergen Habermas who wrote his book „The Future of Human Nature. Towards a Liberal Eugenic?“ (Title translation by Christian Gruenler) in the year 2001 obviously under the impression of the impending conclusion of the Human Genome Project. Even though he explicitly says that it is probably impossible to determine a dividing line between pure material and human life in the very early stages of the human life, he cannot escape from the problem of identifying what a „person“ is, nor can he escape the thought that it is part of a person’s human rights to have unmodified DNA. Maybe in 2001 was still too early to recognize that things are much more complicated than that and that neither the potential right to have the best possible genetic predisposition (see above) nor the problem of defining „human nature“ had sufficiently been discussed yet.

In 2001 Habermas also fell into a trap that was typical for the discussion about genetic enhancement: he assumed that a genetic enhancement decision made by the parents was improper programming (see in particular Habermas, 2001, pp. 105 – 114). He argues for this view by saying that this would limit the life options of the enhanced child in a unethical way. Like many philosophers he does not see the inherent contradiction that any brain researcher, anthropologist and psychologist would detect immediately: there is no reason to believe that a germline modification performed by human hands with a certain intention can be more effective in determining the future traits of the enhanced child than any natural genetic predisposition can. Why should it limit the freedom to develop in a certain way that, say, the serotonin level in the brain is artificially altered versus it being determined by natural coincidence? Quite the contrary: There is reason to believe that the drive towards cognitive enhancement that many parents would probably follow could even lead to an increase in impulse control and, thus to this kind of „free will“ and, as a consequence, to increased instead of decreased life choices, to increased freedom of development instead of genetic programming. Admittedly, both scenarios – increased or decreased programming – are scientific speculations at this point in time. But
it would be clearly a mistake in philosophical thinking to bank on one scenario and to ignore the other one.

As we will see in a later chapter, the concept of a human nature and of protecting our species from „improper alterations“ presented by Habermas in 2001 becomes a blurred and impractical demand if one explores what „human nature“ and the „core of human traits“ really mean. The claim that human nature has to be maintained at all costs seems to be too simplistic in the end. Other guiding principles are needed.

Interestingly, this unclear picture of what it means to be an authentic person as a human being and whether the authenticity of human individuals is endangered by enhancement measures has also been mirrored elsewhere. A very negative picture of this is given in the world famous fascinating 1932 novel by the visionary Aldous Huxley, *Brave New World.* Interestingly enough, this same author wrote the utopian novel *Island* in 1962 in which he turns the argument upside down: human conditions and spirit are enhanced with a drug called „MOKSHA medicine.“ In other words, even the author of *Brave New World* recognized that the authenticity of a person could potentially be endangered, but could also be fostered by what we would consider „unnatural“ enhancement.

In an environment in which fiction has provided more insights than traditional philosophical thought or empirical scientific research, bio (medical) ethics has evolved during the last three decades as a separate field of applied ethics for pragmatic daily practice in hospitals and doctors’ offices, but also with regards to biotech research.

### 4.3. Can Biomedical Ethics According to Beauchamp & Childress Provide a Universal Basis for Decision Making on GEHB?

In the introduction to their book *Bioethik*, Marcus Düwell and Klaus Steigleder report that the term „bioethics“ was first introduced by Daniel Callahan’s article „Bioethics as a Discipline“ in 1971. In 1974 it was first entered into the index of the Library of Congress. So it truly is a relatively new concept, not much more than 30 years old. Callahan was one of the co-founders of the Hastings Center in New York, which was originally named „Institute
for Society, Ethics and Life Sciences.” Bioethics was a response to the problem of traditional medical ethics' not being able to cope with all of the questions arising from the swift progress in biomedical technologies. While traditional medical ethics was meant to be the basis of the relationship between the doctor and the patient, other aspects came into play when organs could be transplanted, starting with the first kidney transplant in 1954. At that point it was no longer certain when a person could be declared dead due to new technologies of measuring brain functions, when the contraceptive pill became fashionable in the early 1960s and when artificial insemination and IVF revolutionized reproduction technology in the 1970s and 1980s. It is due to these historic roots that bioethics is often seen as synonymous to „biomedical ethics.“.

As a consequence, the generally accepted idea was initially that both the role of the maker and the role of the applier of the rules of bio(medical) ethics should be in the hands of medical doctors and researchers in the biomedical field.

The most influential book following the traditional view of bioethics understood as biomedical ethics is probably Principles of Biomedical Ethics by Tom Beauchamp and James Childress, which came on the market for the first time in 1979 with a fifth edition published in 2001. The charm of the approach that Beauchamp and Childress offer is its logical simplicity, the extensive development of easy to use operational rules and the fact that there is no strict affiliation to any higher ranking system of values that could be a cause of old philosophical conflicts. It is probably not a coincidence that in this book only the last chapter is devoted to a study of the connections and roots that exist to the classical philosophical schools of libertarianism, communitarians, utilitarianism, human rights approach, etc. Beauchamp and Childress’s approach is deliberately based on a kind of common sense morality and belongs very much to the category of applied ethics. Their concept is based on four principles:

„Respect for autonomy (a norm of respecting the decision-making capacity of autonomous persons)

Non-maleficence (a norm of avoiding the causation of harm)

Beneficence (a group of norms of balancing benefits against risks and costs)

Justice (a group of norms for distributing benefits, risks, and costs fairly).“

(Beauchamp/ Childress, 2001, page 12)
In the index of the book the words „genetics,” „genetic information,” „genetic screening” and „geneticist” do appear, but there is no mention of „genetic enhancement” in the more than 400 pages of the book. It seems that this book is much too application oriented to be concerned with potential technological developments of the future. Nevertheless two reasons make it a valuable source of ethical thinking about GEHB:

- For one thing, the principles developed by Beauchamp and Childress are so well known in the biomedical field that they almost inevitably influence also ethical evaluations of GEHB by other people than Beauchamp and Childress themselves.

- Secondly, the relationship between medical doctors and patients is very similar to the relationship between those who might supply and those who might demand GEHB services at some point in the future. This is especially true for rules made for doctors who are dealing with the parents as decision makers.

Therefore, it is useful to investigate how the four principles outlined above might be applied in order to evaluate GEHB intervention.

**Autonomy**

The crucial question in connection with genetic enhancement is the one of the surrogate decision maker that Beauchamp and Childress elaborate on in their book extensively (pp. 99-103). The principle of autonomy leads in case of a regular adult person to the requirement of acquiring *informed consent* before any medical intervention is performed. This is obviously not feasible in case of either adults being incapacitated (e.g., because they are unconscious after a serious accident) or in case of children. It is certainly not possible in case of an embryo or when an egg cell or a sperm cell is a candidate for genetic modification. In those cases the principle of autonomy requires a surrogate decision maker who should follow the best interest of the child in the decision-making process. Beauchamp and Childress explain what has to be done exactly: „Under the best interest standard, a surrogate decision maker must determine the highest net benefit among the available options, assigning different weights to interests the patient has in each option and discounting or subtracting inherent risks and costs. ... It is, therefore, inescapably a quality –of-life-criterion. ... Long before autonomy and privacy were pervasively applied through law to incompetents and minors, parents’ responsibilities towards their children was legally defined as the responsi-
bility to act in their children’s best interest. The law assumed that parents generally do act in their children’s best interest and that the state should not interfere, except in extreme circumstances in which the state and parents disagree about some decision with potentially serious consequences for the child – for example when Jehovah’s Witness parents refuse life-saving blood transfusions for their minor children.” (page 102)

Foreseeing that this can be a central issue in surrogate decision-making Beauchamp/Childress even “… propose the following list of qualifications for decision-makers for incompetent patients (including newborns):

- Ability to make reasoned judgment (competence)
- Adequate knowledge and information
- Emotional stability
- A commitment to the incompetent patient’s interest that is free of conflicts of interests and free of controlling influence by those who might not act in the patient’s best interest.” (page 154)

Non-maleficence

The principle of non-maleficence means „one ought not to inflict evil or harm. “ Beauchamp/Childress describe this further by listing the following major examples of harm:

„1. Do not kill;
2. Do not cause pain or suffering;
3. Do not incapacitate;
4. Do not cause offense;
5. Do not deprive others of the goods of life” and they add that this „… also includes obligations of not imposing risks of harm“ (page 117).

The rule of not imposing risks of harm is then, however, explained and somewhat limited by the so-called RDE = rule of double effect. Beauchamp and Childress explain: „The rule incorporates a pivotal distinction between intended effects and merely foreseen effects. The RDE is invoked to justify that a single act having two foreseen effects, one good and one harmful, is not always morally prohibited. As an example of the use of the RDE, con-
sider a patient experiencing terrible pain and suffering who asks a physician for help in ending his life....” (pp. 128-129)

Since it must be assumed that GEHB technologies will at least initially fall under the definition of the RDE – good effects are intended but bad effects cannot be excluded - the details on that issue are of great interest.

„Classic formulations of the RDE identify four conditions or elements that must be satisfied for an act with a double effect to be justified. Each is a necessary condition, and together they must form sufficient conditions of morally permissible action:

- The nature of the act: the act must be good, or at least morally neutral (independent of its consequences)
- The agent’s intentions: the agent intends only the good effect. The bad effect can be foreseen, tolerated, and permitted, but it must not be intended.
- The distinction between means and effects. The bad effect must not be a means to the good effect. If the good effect were the direct causal result of the bad effect, the agent would intend the bad effect in pursuit of the good effect.
- Proportionality between the good effect and the bad effect. The good effect must outweigh the bad effect. That is, the bad effect is permissible only if a proportionate reason compensates for permitting the foreseen bad effect.” (page 129)

Long passages of the book are devoted to the techniques of risk assessment (pp. 194-206 and 319-328), the main issue being clinical testing of new drugs or other new medical technologies and curing methods.

**Beneficence**

This is probably the most easy-to-understand and the most common sense principle. As Beauchamp/Childress point out: „Beneficence and benevolence have played central roles in some ethical theories. Utilitarianism, for example is systematically arranged on a principle of beneficence (the principle of utility) and, during the Scottish Enlightenment major figures such as Francis Hutchison and David Hume made benevolence the centerpiece of their common morality theories. ...

Examples of these rules of beneficence in their most general form are:
• Protect and defend the rights of others
• Prevent harm from occurring to others
• Remove conditions that will cause harm to others
• Help persons with disabilities
• Rescue persons in danger”

(pp. 166167)
The difficulty in dealing with this rule in real-life biomedical practice is the conflict between paternalistic benevolence and autonomy of the patient: „Whether respect for the autonomy of patients should have the priority over professional beneficence directed at those patients is a central problem of biomedical ethics.” (Beauchamp and Childress page 176)

Justice
As has been mentioned above, when Beauchamp and Childress talk about justice, what they really mean is distributive justice, defined as „... fair, equitable, and appropriate distribution determined by justified norms that structure the terms of social cooperation. ...” (page 226)

Philosophers and others have proposed each of the following principles as a valid material principle of distributive justice:
• To each person an equal share
• To each person according to need
• To each person according to effort
• To each person according to contribution
• To each person according to merit
• To each person according to free-market exchanges.”

(page 228)
In the Anglo-Saxon literature (to some extent also in the German speaking literature) that deals with the question of genetic enhancement, mainly the following four issues are considered subject to the principles formulated by Beauchamp and Childress:
• Genetic privacy
• The question of parental autonomy
The risks of GEHB technologies

The availability of genetic enhancement as a question of distributive justice.

**Genetic privacy**

This refers to the issue that somebody is the owner of his/her genetic code and that it is unethical to breach confidentiality by making knowledge about this genetic code known to a third person. It is, so to speak, an extension of the confidentiality rule that has always existed between doctor and patient into another field where the relationship might be more anonymous. In an extreme case the relationship could be between the owner of a robot that is reading genetic codes and the provider of the DNA that is analyzed. Why this could become relevant once genetic enhancement is offered to humans is only apparent when we use a little imagination concerning the procedures that such a service might involve. Most likely genetic enhancement is not possible unless an all encompassing analysis of the genetic endowment of the parents of the enhancement candidate is performed and then somebody does know about it, the information is stored somewhere, etc.

There is not only the problem of the owner of a certain DNA potentially being confronted with negative information about his genetic setup which could be a useless cause of psychological pain as long as there is no cure for the genetic problem available. There is also the problem of enabling a third person to make judgments based on that genetic knowledge. The most common examples in the literature today is employers and insurance companies potentially discriminating on the basis of the information about an individual’s genetic endowment. Should there be genetic modules available one day, ready-to-use and preformed sets of genes that only have to be inserted into the target embryo, then the problem of abuse of such knowledge becomes even more obvious and the horror visions of total control over an individual’s destiny like in Huxley’s *Brave New World* no longer seem so outlandish.

It is evident that these concerns apply in particular to GEHB since information about a person’s disposition to feel, think or behave in a certain way is crucial for exercising power and control over this person, even more so than, say, knowledge about a person’s bones, muscle tissue or immune system.
The question of parental autonomy

This question will be discussed further in a later chapter so that it shall be sufficient to give a brief introduction to this topic here. The key issue is whether parents really would and could fulfill all the requirements of a qualified surrogate decision maker when it comes to genetic enhancement. Here again, this is in particular true for GEHB. Would parents really be competent enough to make far reaching decisions about the genetic setup of their offspring? Would they be able to assess the risks of the treatment in a medical sense? Would they be able to make decisions on enhancements that have long term effects? Would they be able to picture the life of their enhanced child well enough and to compare it with the life it would have without the enhancement in question?

And last but not least: are parents really sufficiently neutral in their concern about the best interest of the child? What if parents follow some fashion or some strange ideal when designing the genetic setup of their child? Would it be, for example, tolerable to allow parents to make their children more parent loving or more religious or more aggressive? To what extent are parents capable of reviewing their values such that they only serve the best interest of their child and not exclusively the satisfaction of their own beliefs?

The ethical aspects of the risks of genetic enhancement

There might be a point in time in the future where GEHB is a standard procedure just like getting a vaccination or getting a filling in a tooth is today – in other words the risk of GEHB is no longer an issue that needs to be discussed lengthily. But between this point in a probably far away future and today there is a long stretch of risky operations that have to be initiated by people who are hopefully not just willing but also competent enough to conduct such experiments on an ethical basis.

The ambitions that are at work in the field of biomedical research became apparent to the general public in case of the Korean researcher Hwang who was celebrated as the first person to successfully clone a human for breeding stem cells in 2004. He subsequently had to admit that he not only bought egg cells from females without informing them properly about how they would be used, but that he had also faked the crucial results of the experiments after they failed.

In another example, an article in the Washington Post (on page A7 of the April 20th, 2006 edition) reported about the discovery that most of the 170
The risk of creating a distorted and suffering „monster“ by germline engineering is a common image in recent books on genetic enhancement. What makes the risks especially great is that any mistake might take many years to become known to its full extent. By then the enhanced person might have already passed on the faulty gene and its consequences down to his or her offspring – this problem has already been discussed at length in a previous chapter. How it would ever be possible to define ethically sound conditions for the first-time trials of GEHB operations with a tolerable risk of inflicting harm, with observation circumstances that do not entail an improper invasion into the privacy of the enhanced subject, how to impose the discipline that is needed for a testing phase that might be decades long … all of this is very difficult to fathom at the moment for most serious authors on the subject. Maybe it will never be possible to fulfill the precondition of the Declaration of Geneva of the World Medical Association that demands that the „….concern for the subject (of research) must prevail over the interests of science and society.”

It could very well be that know-how on GEHB can only be built up in a way that Beauchamp and Childress and everybody who believes in their four principles would not fully approve of. At some point in the future we might be also be confronted with the question on what to do with know-how that has been acquired by somebody who had been ignoring these principles either secretly or openly. This could be by experimentation performed in another country where laws or law enforcement is more lax or simply with experimentation that had been performed illegally. Would it then be ethical to use these genetic codes again since the knowledge does exist and the harm done cannot be reversed anyway? Or would it be an improper incentive for further unethical experimentation and the use of such knowledge should rather be ruthlessly banned?
The availability of genetic enhancement as a question of distributive justice

McKibben, Fukuyama, Stock, Garreau – all of the more recent authors publishing their views about genetic enhancement also bring up the subject of distributive justice if genetic enhancement became a normal feature of modern societies. „Once the natural lottery is gone then what should replace it?” this is the commonly asked question. Lee Silver sees the possibility of two classes of humans developing, the „GeneRich” and the „GenePoor” in his 2350-scenario: „But while racial differences have mostly disappeared, another difference has emerged that is sharp and easily defined. It is the difference between those who are genetically enhanced and those who are not. The GeneRich – who account for 10 percent of the American population – all carry synthetic genes. …the economy, the media, the entertainment industry, and the knowledge industry are controlled by members of the GeneRich class….Naturals work as low-paid service providers or as laborers…. [Eventually] the GeneRich class and the Natural class will become... entirely separate species with no ability to cross-breed, and with as much romantic interest in each other as a current human would. (See Remaking Eden, page5/6/7).

Also McKibben and Garreau talk about the „Enhanced” and the „Naturals.”

Behind this talk of classes developing on the access to genetic enhancement there are always three assumptions at work:

- Genetic enhancement will be expensive
- A free market approach with total parental autonomy will replace the natural lottery.

The government cannot and should not take control of distributive justice because then there is a risk of a Brave New World type system being created over time where categorized humans (either called Alphas, Betas, Deltas and Epsilon types like in Huxley’s novel or specialized humans who are either perfect sports men, perfect thinkers, fearless soldiers, etc.) would replace the unique individuals that populate the world today.

Needless to say, none of these assumptions can be even remotely checked for their degree of plausibility today. The interesting point is not really what has been speculated about future development but that it has been done obviously with something like the principles of Beauchamp and Childress in mind. In their mental world of biomedical ethics the question of distributive
justice is a highly relevant one due to the uneven distribution of health care between rich and poor countries, between rich and poor individuals in wealthy societies and because within the rich societies the costs of health care services are skyrocketing and priorities have to be set. Concerning the latter point one could argue that it would be a complete waste to spend lots of money for researching GEHB technologies while millions of people in Africa still die of AIDS and Malaria every year. As a matter of fact, this argument is already used for research on other rich world medical technologies. For example, Jeffrey Sachs writes in his bestselling book The End of Poverty (2005, page 63): „The massive investments in biomedical research in the rich countries, more than $ 70 billion, largely overlook the challenges of the tropical diseases such as malaria. Rich-country funding is, not surprisingly, aimed at rich-country diseases.”

The principles of Beauchamp and Childress seen from non-Western cultures

The four principles of Beauchamp/Childress may be highly respected in Europe and North America but how universal are they and can they really be? In a brief but very concise article written by the two Taiwanese authors Michael Cheng-tek Tai, Ph.D., Professor of Bioethics and Medical Humanities and Chung Seng Lin, M.D., President and Professor at the Chungshian Medical and Dental College, Taichung in Taiwan, the question of the applicability of those principles in Asian culture is investigated. The authors come to the following conclusion: „Beauchamp and Childress argue that the principles they identify beneficence, non-maleficence, autonomy and justice, along with such derivative rules as veracity, fidelity, privacy and confidentiality are only prima facie binding. In other words, these principles and rules have to be weighted and balanced in decision-making. On the basis of this statement we can confidently suggest that there can be different sets of principles and rules for different peoples in different cultural settings. We may all accept the principles promoted by Beauchamp and Childress, yet in application to concrete situations, tradition should not be ignored or overlooked. Principles of biomedical ethics, thus, cannot be universally binding, but must be culturally relevant.”

Quote from Cheng-tek, Michael and Chung, Seng Lin: The ethics of boosting brain power
http://www.medicalnewstoday.com/medicalnews.php?newsid=7432# (taken from the website on December 10th, 2005)
As an example the authors report that in Taiwan, where Confucianism provides the framework within which ethical values and principles are expressed, it is normal not to inform the patient first when cancer has been diagnosed but instead to talk to the head of the family clan who then will talk to other important family members before the patient himself is even included in the discussion on what to do next.

Beauchamp and Childress do not really offer a firm ethical basis for the evaluation of concrete cases in the biomedical reality. Rather than that, they offer a cabinet with labeled empty drawers that still have to be filled, a framework for an approach that really has to be casuistic when it comes to real life questions. They provide interesting material for endeavors like the attempt of this book to develop an agenda for the ethical discussion on GEHB, but they do not really deliver a lot of content and concrete answers. Depending on how the risks and the benefits of GEHB experiments are weighed can make the difference of reaching the conclusion to go ahead or not. Depending on whether it is believed that parents are qualified to make decisions on GEHB for their children-to-be, whether they will be given full autonomy or not, etc. What might be the basis of success of the principles of Beauchamp and Childress is a wording so general and vague that it would be universally accepted. This could at the same time be a source of disappointment should one look for a content-rich ethical theory that provides rules for applied ethics more directly.

**Limits of the approach of Beauchamp and Childress and alternative views**

There is other criticism that has come within the Western world or should one rather say there are remarks about the limited scope of application to be made. One of them is that Beauchamp and Childress’s principles are designed for medical treatment in a narrow sense that they do not take into account enhancement and are therefore not really applicable in this field. This is not only a problem for future genetic enhancement, but also for today’s conventional enhancement technologies like plastic surgery. For example, in an article that was published on the Medical News Today website of April 2004, writer Amy Adams reports about a meeting at Stanford University where the following argument was brought forth: „Plastic surgery and neural enhancement both raise safety issues, Illes said. However, she and co-chair Martha Farah, Ph.D., professor of psychology at the University of Pennsylvania, feel the risks are more acceptable when treating an illness rather than taking normal, healthy people and trying to make them better.“
Nothing in the book of Beauchamp/Childress supports that view, but there is also nothing in it that would contradict it.

Also, with the roots being in the medical profession rather than in the biological science, the principles of Beauchamp and Childress completely ignore the responsibilities that might have to be considered beyond the well being of the subject of treatment and his immediate social environment. This is in sharp contrast to the bioethical concept that German philosopher Hans Jonas outlined in his 1979 book *Prinzip Verantwortung (The Responsibility Principle)*. In it, he demanded the introduction of a new variant of Kant’s categorical imperative (translation by Christian Gruenler): „Act in such a way that all of your acts are fully compatible with a sustainable real human life on Earth.” (Jonas 1979, page 36). On that basis, Jonas comes to the conclusion in a later publication of 1985 that germline modifications for the purpose of eliminating genetic diseases are acceptable (see Düwell/Steigleder, 2002, page 52).

Others have argued in the same direction and demanded that bioethics should include ethical thinking about biodiversity, safety and security of modern biotech research. This is for example one of the main concerns of the bioethics division of the Organization for Economic Cooperation and Development (OECD), not to mention Peter Singer’s claim that bioethics should include concerns about animal rights and the ban of animal experimentation.

Another interesting approach is the one developed by Edmund Pellegrino (Who took Leon Kass’s position as chairman of the U.S. President’s Council on Bioethics in 2006) and David Thomasma in the early 1990s. (see Düwell and Steigleder 2002, pp. 200-209). Their focus is not on the deed but on the doer, i.e., on the virtues of the medical doctor. In a time when it is even difficult for specialists to follow the rapid development in a highly complex field as biotech, this could be a very promising pragmatic pattern: why not pay more attention to the biotech scientists and their personalities instead of trying to establish content-oriented rules with great difficulty? A 1993 book by Pellegrino and Thomasma with the title *Virtues in Medical Practice* reflects exactly this line of thinking. In this book the authors also investigate the required personality features of those that we entrust our genetic heritage.
Even though today the world is full of bioethics commissions who give advice to parliaments, political parties, governments, research institutions, universities and corporations on what to do, there is clearly no set of standard principles that are at the same time universally accepted and precise enough to encompass all the relevant questions relevant for bioethics in general, let alone questions concerning GEHB. There is no common deontological basis for a set of precise and concrete global bioethics rules at this point, nor is there an international universal consensus on standards nor even a bioethical consensus within the Western culture.

It is, thus, maybe not too surprising that during the same period in which bioethics as a field of applied ethics was established, there were a number of attempts to find a universal basis for human morality by pursuing a quite different approach. The search for universal standards for human morality by applying a perspective that I would call the „biological view of humanity."

4.4. „Human Nature“ as a Universal Basis for Ethical Judgments on GEHB?

4.4.1. What is „Human Nature“? – Francis Fukuyama's „Factor X“

If you have decided that enhancement should be completely banned even if it were technologically feasible and completely safe, then the definition of „human nature“ in its present form is of major concern to you because this is the status that you want to maintain at any price. But when going into the details you will realize that it is extremely difficult to define „human nature."

But also if you are in favor of genetic enhancement, then you will be confronted with the question what „enhancement“ means exactly in relation to human nature. Take intelligence, for example, and for the sake of making the point very clear let us assume there were no problems and discussions about the methodology of measuring it. Let us assume that IQ can be accu-
rately measured and consider the following question with relation to what is a permissible degree of enhancement:

- Does it mean that it is ethical to eliminate the discrepancy between below-average and average (e.g., increase the intelligence of natural IQ 50 individuals so that they will have an IQ of 100)?
- Does it mean that the discrepancy between the top performers and the rest of the human population should be eliminated (e.g., increase everybody’s IQ to the one that geniuses have, like Einstein’s 200)?
- Does it mean that the goal should be to increase the general average, so that, for example, whole populations - and in an ideal future world humanity in its entirety - will have an average IQ of not just 100 but then let us say 150 or 200? Or does it mean that single parents are allowed to keep this limit if they want to?
- Does it mean going beyond what is known to be the standard of the best top performers today? For example should (or may) enhancement have the goal of reaching IQ levels of 300, 400, 500 or more?

These questions came up briefly in an earlier chapter since they are relevant for the technological feasibility of those enhancement goals on the one hand and for the question of whether certain germline interventions shall be classified as „therapy“ or as „enhancement.“

Human nature has played an important role in the philosophy of the last 2500 years again and again in different forms. It would go way too far to give an account of the wealth of philosophical thinking here. Only a limited number of the most relevant issues for genetic enhancement can be pointed out here.

A good start is Fukuyama’s thoughts on this topic. Of all the authors taken into account for this book, Francis Fukuyama, as a moderate and intellectual opponent of genetic enhancement, has considered the question of how to define human nature in the most interesting and thorough way. In a first step, he offers the verbal definition: „... human nature is the sum of the behavior and characteristics that are typical of the human species, arising from genetic rather than environmental factors.“

He then illustrates that this concept allows variance without becoming obsolete by elaborating on the typical height of humans as an example: „In fact, all natural characteristics show considerable variance within the same species; natural selection could not occur if this were not so. ... There is no such
thing as a normal height; the distribution of heights in a population does, however have a median ... Strictly speaking there is no such thing as a ‘species-typical height’ only a species-typical distribution of height (see bell curve below); we all know that there are dwarfs and giants. ... But none of this means that it is meaningless to talk of species-typical heights for a population of human beings: the median of the human distribution will be different from the median of the distribution for chimpanzees of elephants. ... Genes play a role in determining both the medians and the shapes of the curves; they are also responsible for the fact that the medians of the male and the female curves differ from each other. ... Nature does not establish a single median human height; median heights are themselves normally distributed depending on diet, health, and other environmental factors. ... On the other hand, there are limits to the degree of variance possible, limits that are set genetically: if you deprive a population of enough calories, they starve to death rather than growing shorter, while past a certain point, increasing calorie intake makes them fatter, not taller.” (Fukuyama, 2002, Our Posthuman Future, page 130-133)
Fukuyama explains that an individual's height might be influenced by many non-genetic factors, above all by nutrition. Of course these non-genetic factors are strongly dependent on „cultural“ or historical circumstances in the biography of a human being. For example, unfavorable local eating habits and the scarcity of food during wartimes might lead to people being very short. Therefore, the average height of humans in the year 1500 was different than the average height in the year 2000 (see bell curve graphic above). On the other hand, there are of course also genetic factors determining how tall somebody grows. The result is a quite considerable range of different heights - there might be midgets measuring only 80 centimeters and there are giants measuring 2.80 meters. But by far most people are somewhere close to the worldwide averages of some 1.75 meters for men and around 1.60 meters for women. As time goes by these averages might move. For example, modern agricultural methods have created a sufficient food supply for the billion persons populations of India and China during the last 20 years. Thus the world average will almost certainly go up as the younger and taller Indians and Chinese become more and numerous and their often undernourished parents grow old and pass away.

Fukuyama does not reach a point where he can give us a conclusive answer on what human nature is – or as he calls it „Factor X.“ After many pages of pondering the question in his book Our Posthuman Future, he provides the following definition in a chapter with the title „What to fight for“:

„What is Factor X? That is, Factor X cannot be reduced to the possession of moral choice, or reason, or language, or sociability, or sentience, or emotions, or consciousness, or any other quality that has been put forth as a ground for human dignity. It is all of these qualities coming together in a human whole that make up Factor X. Every member of the human species possesses a genetic endowment that allows him or her to become a whole human being, an endowment that distinguishes a human in essence from other types of creatures.“ (Fukuyama, 2002, page 171)

4.4.2. Genetic Differences, Sexism, Racism and Political Correctness

Fukuyama's struggle with the variance within a species gets right to the point of taking human nature as the base for further ethical or political con-
clusions. How relevant this is, show the UN declarations quoted above. For example, concerning the statement of the „UN Universal Declaration on the Human Genome and Human Rights” of 1998 that „The human genome... is the heritage of humanity“ one is almost tempted to ask whether the diplomats who made this declaration were well advised by scientists in the light of the problems of defining what is „species-typical.“ What exactly does this sentence mean when it is clear that each individual’s genome is different? What exactly are the genes in a human’s DNA that are protected by this declaration and what about the many genes of any specific individual human that deviate from this „norm“?

It is very difficult to find out the pure genetic differences between individuals and groups of individuals because the genetic factors first have to be separated from the biographical and environmental factors. We have just seen a good case study of this problem with Fukuyama’s height example. On the other hand, it is a known fact that there are genetic differences amongst the human population.

In his book _The Blank Slate_, (Pinker, 2002), Steven Pinker analyzes the latest status of the nature-nurture-debate, which has been going on for some 50 years now, very thoroughly. He is not afraid of touching politically hot issues. For example, right in the preface he mentions the following two studies as one of the reasons why he thinks that a book about the nature-nurture issue is not superfluous even in 2002:

- A study with the title „The Bell Curve“ by Hernstein and Murray from 1994 that investigates the difference in IQ between American whites and American blacks.

- A study from Thornhill and Palmer from 2000 with the title „A Natural History of Rape“that argues that rape has biological roots and is not just a product of distorted culture or upbringing.

Many consider scientific research projects of this kind to be unethical, in spite of the fact that they are produced in an honest attempt to apply sound scientific methods. The point is that whatever result may come out of them, there will be knowledge gaps left and further questions remain open. Due to the complexity of the issues it is inconceivable that there could be a complete and unambiguously correct answer to the scientific questions involved. There would have to be many studies and considerable scientific exchange and discussion, yet there still would be a possibility that the results are unsatisfactory because the picture remains incomplete.
Unfortunately, to generate the information needed to find out the technological leverages for genetic enhancement, genetic differences between large numbers of individuals and the corresponding traits would have to be researched extensively. The fact that in 1998 the National Science Foundation in the U.S. stopped funding research on the relationship between race and crimes committed was a landmark example for the political problems that may result from this kind of research. For many this kind of research raises the question: „Are the results of such research really relevant?“ This is because gender and racial differences have a long history of social conflict since different sexes and races are often correlated with a measurable difference in social status, economic wealth and rights.

For multiethnic societies that are constantly striving for equal rights it has always been difficult to cope with genetic differences even though in those societies a lot of money, effort, education and political correctness publicity are often invested to eliminate the problems of attitude. Afro-Americans in the U.S., for example, are still less respected, less healthy, less educated and less wealthy than the rest of the population. Just imagine what would happen, should the old racists' claim that Afro-Americans are endowed with less intelligence by nature really turned out to be true and could be proven with empirical results that are beyond any doubt. What would that do to the social peace in a country like the United States? Or what would happen if exactly the opposite became a scientific fact and it would turn out that the whites are less intelligent by nature than the dark-skinned?

Gender relations also remain difficult and the life situation of females and males is still quite different in spite of all efforts to eliminate the inequalities. For example, empiric research shows again and again that on average women still get less pay, while males suffer much more from stress-related symptoms and die earlier, just to name two examples. What would it do to the personnel policies, health insurance policies and labor laws if it turned out that all these differences are definitely tied to genetic differences that are hard to overcome by cultural efforts? It should be noted that there is no research offering such clear results, but in this very fact lies one of the dangers of this reductionist approach.

With the migration of Homo sapiens taking some 100,000 years, the ethnic Europeans, Africans or Asians have been separated from each other for a few thousand reproduction cycles, sufficient to make genetic differences possible. Human beings look different for genetic reasons (skin color, hair color, eye shapes, etc.), so why shouldn't their brains be genetically different
as well? But exactly this obvious question about the segmentation of humans not only into different looks categories but also into different categories concerning feelings, cognitive powers and social behavior is a major cause of disturbance for ethically sensitive researchers concerned about the political impact of this kind of research. Colonialism, in particular slavery and the history of race relations in the United States, the Holocaust, the crimes of the Japanese army during WW II, the genocide in Burundi, etc., – all these atrocities of human history have made it highly problematic for researchers to investigate genetic differences between humans without reaching the outer limits of political correctness.

This might be less problematic in the case of body height, or other, politically irrelevant traits. For example, take the ability to digest milk: over 80% of Europeans and Americans are able to digest milk well, while most Asians and Africans do not have the genes that produce the enzymes to digest lactose, the sugar contained in milk. The explanation is that Europeans developed this gene in order to be able to extract the needed amount of vitamin D from milk, while Asians and Africans were able to produce sufficient vitamin D simply by sufficient sunlight shining on their skin. The political stakes of this kind of genetic difference are obviously not very high.

But other findings could potentially be very problematic if differences between segments of the human population are found concerning the number of dopamine receptors, or the number of liaisons between the right and the left half of the brain, or the size and functioning of the amygdales, or the size of the cortex, and all the other features that determine the physical structure of the human brain. It would be surprising if there weren’t any genetic differences of this kind between individuals on the one hand and between segments of the worldwide human populations on the other hand. But they need to be interpreted, which can be tricky business considering the quickness to pick up sensational discoveries before they have been thoroughly researched and confirmed.

In the *Süddeutsche Zeitung* of February 24th, 2006, there was an article (on page 48), that cited a 2005 study according to which Germans tend to have on average a lower blood pressure than the rest of the worldwide human population. Low blood pressure leads to a lower degree of oxygen supply to the brain and this, in turn, tends to lead to a lower ability to focus and a tendency to be depressed more often. What Germany’s neighbors have always perceived to be a typical trait of Germans – being pessimistic, depressed, melancholic and negative – might, thus, be at least partly due to a
biological trait if this study is correct. It would go too far here to check the soundness of the scientific work behind the quoted study or to find out to what extent the conclusions delivered is really justified. But it is, nevertheless, a good example for the direction that research on genetic differences could lead to and how it could be handled in the media.

Also, according to an article of the New York Times (N.Y.T. supplement to the Süddeutsche Zeitung on Monday, March 27th, 2006, page 6), several recent studies have found that the regional differentiation of the human genome is much more profound than was previously thought. Again it remains to be seen whether these research results will be generally accepted. If they are, then this could of course also be true for genes that affect behavior. For example, this article in the New York Times claims that the genetic disposition for aggression had grown considerably in a certain tribe in the Amazon since men who had killed enemies in battle had three times the number of children than those who had not.

These examples also all show what the point here is: that there might be many „human natures“ and not just one, and that this could well be true even after we have eliminated the giants and the dwarfs from our scope of observations. In other words, there could be a serious problem of „multiple flavors“ of what is „human“ that could in effect make it impossible to find a generally acceptable definition.

4.4.3. Natural Rights, Natural Ends

One of the factors that lead authors to believe that human nature should be the focal point and the basis for all ethical theories is the notion of humans as moral animals.

The thought of human nature as a source of human morality is a very old one and dates back to Aristotle’s thought that human beings, like all natural beings, have natural ends so that whatever fulfils those ends is naturally good or right for them. Aristotle deduces from this consideration the claim of „natural rights“ of human beings. Aristotle regards human beings to be „political animals“ and from that point of view he declares everything that enables them to pursue this natural tendency to be good, everything that prevents them to do so to be bad – to put it in simple words.
Charles Darwin considered morality to be one of the criteria of natural selection. Darwinian theory includes the thought that the individual may be disadvantaged within the same community by adhering to moral rules when others do not. But Darwin also saw that the competition between human groups could be a major factor for shortening life or for providing opportunities to reproduce and raise children to the age of reproduction. He concludes: “... advancement in the standard of morality will certainly give an immense advantage to one tribe over another. There can be no doubt that a tribe including many members who, from possessing in a high degree the spirit of patriotism, fidelity, obedience, courage and sympathy, were always ready to aid one another and to sacrifice themselves for the common good, would be victorious over most other tribes; and this would be natural selection. At all times throughout the world tribes have supplanted other tribes; and as morality is one important element in their success, the standard of morality ... will thus everywhere tend to rise and increase.” (Darwin, 1871, page 166)

This „biological“ understanding of human beings is the foundation of viewpoints like the one of Frans de Waal who compares communities of apes and dolphins with communities of humans and finds a lot of similarities. It is also the foundation of Peter Singer’s and Robert Wright’s claim that there is a continuum rather than a complete break between the realms of animals and humans that is bridged by processes that the discipline of evolutionary psychology is out to explain.

This could be said for intelligence and other cognitive brain functions as well as for moral behavior according to the latest theories of evolutionary psychology. The ex-theologian and now-agnostic Michael Shermer scrutinizes in his 2004 book The Science of Good and Evil this paradigm of the species typical distribution of traits with built-in natural limits to shift the median means for the morality of mankind by citing numerous recent studies on the issue. For one thing, he comes to the conclusion that there is no such thing as a „purely good“or „purely evil“ person. According to Shermer „morally normal“ is defined as what most people do most of the time, with each individual person carrying within himself the potential for a wide range of behavior. Some behavior is just more likely to come to the surface than others depending on the situation and genetic disposition. This statement is indeed very reminiscent of the bell curve for human height that Fukuyama quotes as his explanatory example.
These views obviously deny the theory of human beings as a „tabula rasa” at the time of birth. This was formulated by John Locke and remained a powerful school of thinking up to the behaviorists of the 1960s and 1970s. Fukuyama (2002, pp. 140-141) writes: „This is the Lockean tabula rasa: the brain is a kind of general-purpose computer that can take in and manipulate the sensory data that appear to it. But its memory banks are essentially blank at the moment of birth. ... Today the idea of the tabula rasa lies in shambles. Research in cognitive neuroscience and psychology has replaced the blank slate with a view of the brain as a modular organ full of highly adapted cognitive structures, most of them unique to the human species. There are in fact what amount to innate ideas or, more accurately, innate species-typical forms of cognition, and species-typical emotional responses to cognition. “

Political science professor Larry Arnhart points out several potential objections to developing a theory of the contents of natural rights before he goes on and does exactly that. The most important one of those objections are (see Arnhart, 1998, pp. 9-11):

The fact-value dichotomy, meaning that there is an improper mixing of what is and what ought to be if we derive morality by observing human nature. Arnhart's response to this objection is: „If human good is what is desirable for human beings, then the facts concerning the natural human desires do imply ethical conclusions.”

Human freedom, meaning the possibility to decide freely without being determined by a natural disposition. In connection with this also human learning (meaning that we can store acquired knowledge and can hand it down to other humans and to our descendants) and human culture (meaning that we can exchange what we have learned by way of language with other human beings which will further decrease our dependence on natural determination). On this point Arnhart quotes the 1994 autobiography of the great evolutionary biologist Edward O. Wilson as follows: „Human beings inherit a propensity to acquire behavior and social structures, a propensity that is shared by enough people to be called human nature. The defining traits include division of labor between sexes, bonding between parents and children, heightened altruism toward closest kin, incest avoidance, other forms of ethical behavior, suspicion of strangers, tribalism, dominance orders within groups, male dominance overall, and territorial aggression over limiting resources. Although people have free will and the choice to turn in many directions, the channels of their psychological development are never-
theless – however much we might wish otherwise – deeply influenced by the genes in certain directions than in others. So while cultures vary greatly, they inevitably converge towards these traits. The Manhattanite and New Guinea highlanders have been separated by 50,000 years of history but still understand each other, for the elementary reason that their common humanity is preserved by the genes they share from their common ancestry.” (Arnhart, 1998, page 5)

*Impermanent species*, meaning if we seek stable human universals to be used as foundations of a general human morality, then the permanent changes happening in any species might be a problem. Arnhart’s response: „Despite the mutability of species in evolutionary time, the patterns of speciation are stable enough over long periods of time to justify our apprehension of natural kinds a enduring features of the world.”

So if we accept the thought …

- … that there is something as human nature defined as a species-typical feature notwithstanding individual variations and deviations;
- … that this human nature does not only apply to physical traits but also to psychological ones;
- … that there are no good philosophical reasons to doubt the method to critically derive moral values from natural traits of the species; …

Then the next inevitable questions in the context of this book are:

- What are these elements and principles that form a universal human morality?
- And eventually: are these elements and principles concise and concrete enough to allow the deduction of moral rules concerning GEHB?

A classic research work that is quoted by Arnhart as well as Shermer, Fukuyama and others is the 1991 study of Donald Brown entitled „Human Universals.” Brown went through a large volume of information on some tens of different cultures and pursued the question what they all had in common. He found 373 „universals,” i.e., behavioral or customary traits that are shared by all of these cultures. The implication of his work is that those must be traits that are not relative to cultural differentiation but are a common ground that must be somehow sought in natural – i.e., genetic – factors since most of the cultures investigated were prevented from communicating with each other due to geographical or other boundaries. Shermer, who uses this list as the basis for his further elaboration on natural human moral-
ity, claims that he found 202 of those universal traits to be directly linked to moral and religious thinking and behavior, which is by far the majority. Shermer develops out of these 202 universals an easy-to-understand set of three principles that are supplemented by the more implementation-oriented moderation principle:

„The ask-first principle states: to find out whether an action is right or wrong, ask first.

The happiness principle states: it is a higher moral principle to always seek happiness with someone else’s happiness in mind, and never seek happiness when it leads to someone else’s unhappiness.

The liberty principle states: it is a higher moral principle to always seek liberty with someone else’s liberty in mind and never seek liberty when it leads to the loss of liberty of someone else.

To implement social change, the moderation principle states: when innocent people die, extremism in defense of anything is no virtue, and moderation in the protection of everything is no vice.” (Shermer, 2004, pp. 187-190)

Shermer also concludes that the most valuable rule for forming morality is the old „Golden Rule“ (of reciprocity) that not only has been confirmed over and over again during 3000 years of human history (and maybe before that, but we do not have written statements on it) but that implicitly also exists in the realm of higher developed animals (see the research of Frans de Waal and others).

Arnhart’s book *Darwinian Natural Right* is quite concrete on the content side of ethical base elements derived from human nature. He claims 20 natural, universally human desires form a basis for his theory on universal human morality that are interesting to read because the list immediately shows the potential for controversy:

1. A complete life
2. Parental care
3. Sexual identity
4. Sexual mating
5. Familial bonding
6. Friendship
7. Social ranking
8. Justice as reciprocity
9. Political rule
10. War
11. Health
12. Beauty
13. Wealth
14. Speech
15. Practical habituation
16. Practical reasoning
17. Practical arts
18. Aesthetic pleasure
19. Religious understanding
20. Intellectual understanding

Once again, it would go too far to discuss all of these elements here in this book, but it is certainly safe to say that defining human nature in a way such that it cannot be contested is very difficult if not impossible.

4.4.4. Conclusions

The thought of deriving moral norms directly from human nature might be especially appealing in a 21st century world where no local morality can be completely protected any more from the challenge of being confronted by alternative views and by the information, the opinions and the emotions that are transmitted by travelers, the Internet or international broadcasting systems. The need for a solid global morality base appears to be greater than ever before. Looking at human nature as a source of moral norms theoretically does have that potential, which is the major strength of this approach.

This approach is usable for sensing the limits of human flexibility. For example, only political systems that do not intend to eliminate the family as a cornerstone of society will be in line with what humans want and will have a chance to stay out of the garbage can of history, according to Larry Arn-
hart. Communism was not such a system and, thus, was doomed to fail from the very beginning.

As tempting and appealing as this approach of searching and defining human nature as the workbench of an ethicist might be at first sight, it soon becomes apparent that this approach has two major weaknesses when applied in the ethical evaluation of GEHB. Those two weaknesses are so important that the search for human nature is not really a viable starting point for searching for ethical guidelines for GEHB after all:

- First, the empirical evidence for determining what is within the realm of human nature and what is „unnatural“ and therefore does not have to be taken into account is not detailed and sound enough to make any far reaching political decisions on this basis. As interesting as this line of thinking is, most of the practical decisions will still have to be made on the basis of „qualified guesses“ on what is still acceptable or not. For example, the replacement of the family by larger and more anonymous units of the society is not a black or white decision at all. Even if the total abolishment of the family as an institution were ingrained in the genes of humans, there are still many shades between total abolishment as one extreme to the total family fixation of, say a tribal clan or of a Mafia gang on the other. The most difficult question of the ideal degree of family orientation remains unanswered.

- Secondly, even if there were a clear determination possible of what human nature is and what isn’t, the most relevant weakness when it comes to GEHB would still exist. Taking human nature as the starting point for formulating an ethical theory implies that there is a deontological belief in the „wisdom of nature,“ i.e., that nature will automatically produce the best basis of everything. „Why,“ – would a transhumanist probably ask – „should we assume that? It may well be that during evolution humans acquired a preference for family relations over other kinds of relations, but why should we accept that as a given if we come to the conclusion that these family ties are a burden for the development of a global society? Doesn’t and shouldn’t enhancement mean exactly that: To raise ourselves above what nature has randomly foreseen for us?“

Fukuyama (on page 129 of his book *Our Posthuman Nature*) quotes Nietzsche as saying:

„According to nature you want to live? Oh, you noble Stoics, what deceptive words these are! Imagine a being like nature, wasteful beyond measure,
indifferent beyond measure, without purpose and consideration, without mercy and justice, fertile and desolate and uncertain at the same time; imagine indifference itself as a power – how could you live according to this indifference?“ (Friedrich Nietzsche, Beyond Good and Evil, Section 9)

These last questions take us directly to the world view that I decided to call „Evolution Skepticism. “
5. EVOLUTION SCEPTICISM: „WE ARE ALLOWED AND WE EVEN SHOULD TAKE HUMAN EVOLUTION INTO OUR OWN HANDS”

5.1. Introduction

When you enter „evolution skepticism“ as a search word into the Google system, you will get a great number of websites that deal with the question of whether evolution really happened or whether there wasn’t some „intelligent designer,“ i.e., God, who created life in all of its forms in the literal sense of the word of the Bible. This chapter uses the term „evolution skepticism“ in a quite different way, almost the opposite way. This chapter will portray a whole category of opinions and attitudes in relation to evolution which could be summarized in the phrase: „Since evolution is such an imperfect system, we are not only allowed to take over and design our own nature as we like, we even should do so.“

For the ethical evaluation of GEHB this is highly relevant. The belief in evolution skepticism declares the belief in the wisdom of nature to be mystic stupidity and concludes that we are obliged to use our intelligence to balance out the shortcomings of „mother nature. “ To put it bluntly, this would mean that we are not only fully allowed to apply GEHB; it might even mean that in some cases we are morally obliged to do so.

The chain of argumentation of the evolution skeptics of this kind has two possible starting points:

Either it is an analysis of the results of evolution - in particular of the human species - that are scrutinized in their features in order to support the argument that something as imperfect as the species homo sapiens does not deserve the sanctity that is commonly awarded to it;

Or it is the analysis of the rules of the evolutionary system from which the same philosophical arguments are derived.
To fully understand these lines of argumentation, it makes sense to give a brief account of the history of evolution as well as of the rules of evolution. Plenty of material is available that delves much deeper into these subjects than is possible in this book, but I would dare nonetheless to recommend four out of the many publications because of the comprehensive overview they provide to a non-scientist:


Spektrum der Wissenschaft Sonderheft 2/1999 on Charles Darwin


But when we talk about evolution in a scientific and philosophical way, the literature recommendations would be incomplete without mentioning the two proponents of two opposing views concerning the inevitability of Homo sapiens as a result of evolution:

- Stephen Jay Gould (who passed away in 2002) claimed that humans are one of the random results of evolution. At any given crossroad things might have developed completely differently. For example, if a meteorite hadn’t wiped out dinosaurs, then Homo sapiens in its present shape and looks probably never would have come into existence. The most extensive work of Stephen Jay Gould is his 750-page book „The structure of evolutionary theory“ that was published in the year he died.

Simon Conway Morris, a recognized scientist who does not try to hide or negate his Christian convictions, on the contrary believes that a homo sapiens is a logical result of the existing evolutionary system. If the species was wiped out now it would follow from the inner logic of this system that it would come into existence again. Conway’s 2003 book *Life’s Solution* provides a good insight into his arguments.

### 5.2. The History of Evolution

The dispute between Gould and Morris is very meaningful for the topic of this book. In the end, the emotions and attitudes towards evolution as well as the knowledge that somebody has about evolution, could be the single
most important factor for determining the person’s ethical position towards genetic enhancement in general and towards GEHB in particular. Thus, in order to fully comprehend genetics on the one hand and – more importantly – in order to understand and evaluate ethical judgments about our genetic future on the other hand, a brief look at where we come from is crucial.

The following images with timetables are copied from Zeman, (2003, page 274) because they summarize our knowledge of the history of the universe in a very compact way. There is nothing to add to these little graphs except for brief narratives explaining them:

The current theory of the universe says that it started to exist with a big bang about 15 billion years ago and has been expanding ever since.

Our solar system was formed about 4.5 billion years ago, i.e., our sun as well as all the planets, including the planet Earth.

Life started probably some 3.5 billion years ago. First, there were forms of life that could be described as pure DNA. These probably came into existence due to a certain coincidental combination of mild temperatures (+50°C to -50°C is relatively „mild“ in the universe), the presence of elements like carbon and oxygen and the initiating function of natural electricity. All of these factors have been crucial to the formation of the complex molecules that all living creatures consist of.
From a bunch of molecules the development went to single cell creatures over many millions of years. Multi-cellular life, i.e., organisms consisting of more than one cell, came into existence around 500 million years ago. The first ones left the oceans and to live on land some 350 million years ago. Mammals have existed for the last 150 million years, primates for around 60 million years.

The latest finds of hominid fossils are some 5 million years old and were found in East Africa.

The history of the various hominid species is above all a success story of the human brain, which has become ever larger in size and in its dynamism. This is measurable, for example, by ever increasing energy consumption:

*brains grew bigger – and hence more energetically demanding – overtime. The modern human brain accounts for 10 to 12 percent more of the body’s resting energy requirements than the average australopithecine brain.*

*Source: Scientific American special Edition Human Evolution (2003), page 66*
Only some 160,000 years ago Homo sapiens appeared. The oldest skulls were found only recently in June 2003 in Ethiopia. The mobility curiosity and technical capabilities were already so great that, according to the predominant „second Diaspora theory,“ Homo sapiens left its evolutionary home in East Africa some 120,000 years ago to populate the whole world over a period of 100,000 years. Homo sapiens migrated to the Middle East some 90,000 years ago; only around 40,000 years ago Europe was populated, and 15,000 years ago the Americas.

For a long time, for some 130,000 years, Homo sapiens was not the only hominid species on earth. Only around 25,000 years ago, with the death of the last Neanderthal man, Homo sapiens was the only remaining human species.

The first settlements with larger groups of Homo sapiens (i.e., more than the usual clan of not more than 150 people) were found where the Czech Republic is today. They were built around 20,000 years ago during the ice age. Around 10,000 years ago domestication of livestock and farming became common. It was around 5,000 years ago, with the invention of writing by the people of Sumer, –that we call the end of prehistoric times and the beginning of „history.“

It is important to note that the evolution of man as outlined on the above pages is not just a wild hypothesis, but is well founded by plenty of scientific evidence. This is mainly based on radiological methods applied for the analysis of bones and tools that are very reliable and very exact.

This is important because the evolutionary history of Homo sapiens is not a view shared by everybody, in spite of this sound scientific foundation. In a few states of the United States, for example, religious fundamentalist lobbying has resulted in laws that require teachers in schools to portray the scientific and the biblical version of the creation of mankind as equal in value and credibility. „Creationist“ activists have succeeded in taking over the power in committees that are responsible for making decisions on the curriculum and the contents of school books in Kansas and in Pennsylvania in 2004/2005. The political fights to exclude them are still going on as this book
is written. Even though it can be assumed that these incidents will remain a footnote of the world history of philosophical ideas, they show nevertheless that evolutionary theory is a hot spot of philosophical discussion. Why is that so and what does that have to do with the ethical discussion about GEHB?

During the last 10,000 years or so, the history of mankind was dominated by two areas where there was exponential growth:

- **Exponential growth in technological advancement.**
  This needs little explanation, just compare the technological situation of the years 10,000 B.C. and 6,000 B.C. and you will find little difference. Compare the year 6,000 B.C. and 2,000 B.C. – with equally 4,000 years in between – and you will find major differences in the way human beings lived, how they had formed their environment, what weaponry they used in conflicts and to what extent they dominated their environment. And then compare the year 2,000 B.C. and the year 2,000 A.D and you will find even much larger differences than the ones you had found before. Now look at only the last 200 years in which we developed first steam engines, then trains, then cars, computers, nuclear bombs, jet-propelled airplanes that can transport hundreds of people, laser beams, etc. …

- **Exponential population growth**
  The following two charts show clearly the amazing development of the world population of Homo sapiens during the last 12,000 years (see next page):
World Population (in billions)

Agriculture, first settlements  Pyramids

Year  (negatives are BCE)

Population at time of Jesus: about 300 million


World Human Population 1650-1995
The number of Homo sapiens subjects alive simultaneously according to estimates developed approximately like this:

10,000 B.C. Less than 10 million
1,000 A.D. 300 - 400 million
1600  500 - 600 million
1800  Around 1 billion
1950  Over 2 billion
2000  Some 6 billion

We are very much used to considering growth in numbers to be a success. Seen from this perspective, there is no doubt that Homo sapiens is the most successful creature that has ever lived on Earth. Never has any species that consists of creatures with such large bodies as Homo sapiens succeeded in producing so many subjects alive at the same time. We are outnumbered only by insects' species, with all of these species together having a total biomass (= number of bodies multiplied with the average individual body volume) that is only a small fraction of the total biomass of the species Homo sapiens.

And yet, there are numerous critics of this positive way of looking at this success of numbers and volume. There are three major concerns to be found amongst those who lack enthusiasm for the past and present development of Homo sapiens. The next pages will deal with these doubts one by one.

5.3. **Doubts that Homo sapiens in its Present Form is the „High-Quality Result” of Evolution that He Seems to Be at First Sight**

5.3.1. **Introduction: Stephen Hawking’s Question**

The following article originates from the website of the British Newspaper „Guardian Science” on August 22nd, 2006, and it mostly speaks for itself (http://www.guardian.co.uk/science/story/0,,1836051,00.html):
The great man's answer to the question of human survival: „Err, I don't know”

Hawking’s conundrum draws 25,000 responses; Best bet, he says, may be to go into outer space

an Sample, science correspondent Thursday August 3, 2006

„It was an unusual move for one of the world's most eminent scientists. Having built a career shedding light on the darkest secrets of the universe, from the essence of space-time to the complexity of black holes, Professor Stephen Hawking turned to the Internet for answers to the latest conundrum occupying his planet-sized brain. Introducing himself to the online community as a theoretical physicist and Lucasian professor of mathematics at the University of Cambridge, the 64-year-old scientist posed an open question: ‘In a world that is in chaos politically, socially and environmentally, how can the human race sustain another 100 years?’

The question appeared on the website „Yahoo Answers“ a month ago, immediately stirring up an Internet storm that saw more than 25,000 people log on to give their deeply-considered views: some said we should just learn to get along, others predicted technology would see us through, and more still invoked the powers of God, love and peace.

But what the world wanted most of all was to hear the great scientist answer his own question, an intervention, most were convinced, that would amount to nothing less than a definitive treatise for human survival. Yesterday, the professor's response finally arrived. In a video clip submission, the familiar electronic voice pronounced: 'I don't know the answer. That is why I asked the question.'

Signs of disappointment were muted yesterday, with one respondent choosing to applaud the scientist's honesty. 'It is humbling to know that this question was asked by one of the most intelligent humans on the planet ... without already knowing a clear answer,' wrote Inetap.

Others took a more encompassing view of life, concluding that humans had had a good innings and it was time to hand over the planet, albeit in a shabby state, to a new caretaker species to see if they could do better. 'Maybe the human race shouldn't survive. Let other life forms flourish. We suck,' said Video_stoooge.

But Prof. Hawking’s frank admission that even he was stumped by the question merely opened a lengthy response. In a four-minute recorded re-
ply, he laid out a beginner’s guide to the changing face of threats to mankind, from devastating asteroid impact and nuclear war to climate change and rampaging genetically modified viruses.

In the long term, Prof Hawking says, humans will only survive if they can leave the rock they call home and spread out into space, to transform and occupy planets around our own sun and then around other suns. Failing that, he adds, *perhaps our best bet is to use genetic engineering to tinker with the human species and make us less prone to fighting war.*

The reply has now joined the multitude of responses from others who tried to answer the original question, among them succinct advice for us all to eat more fruit and vegetables, fledgling plans to live underwater, and functional advice to keep eating, breathing and having sex. But Prof. Hawking’s message cut the online community into broad camps, populated by optimists, religious groups, climate change deniers and fellow doom-mongers. Rabbit, one poster, believed that despite war, climate change and a breathtaking acceleration of new technology, humankind was not about to annihilate itself. 'It will work out ... There will undoubtedly be problems and disasters, but nothing so devastating to match your pessimism. Lighten up!' The scientist’s personal favorite answer came from the fittingly monikered Semi-Mad Scientist. 'Without the belief that we will continue to grow and overcome the pains of social chaos as we mature as a species, we might as well not have any faith at all. I'm not talking religion ... but simply the same belief that we will survive just as much as the sun will rise the next day,' he said."

This article in its typical style of a British newspaper gets to the very core of the problem when summarizing the intellectual debate about the quality of Homo sapiens as a result of evolution: it is unclear. Wide ranging answers are the response to a seemingly simple question about our survival during only the next hundred years, a question that seems to be as simple as outrageous at first sight. It is interesting to note that the question with its pessimistic undertone brought out the pessimists’ view, which is why it is interesting in our context here. The following pages try to summarize the pessimists’ view not only from the answers to Stephen Hawking’s questions but to various other sources that would be impossible to list due to their total volume and their incredible variety.
5.3.2. Ecological Concerns: „The Immense Boom of Homo sapiens Destroys the Rest of Nature and thereby also the Natural Habitat of Humanity“

This sentiment can be subdivided into several attitudes that might overlap or exist separately in a single person’s mind.

„Biodiversity is lost and the flora and fauna are distorted with potentially negative effects for all living creatures“

Hand in hand with the growth of the human population we are forced to observe a radical shrinking of the number of other species. Of the estimated 5 million species living on Earth today, every year around 30,000 species are being extinct – a scary rate indeed. Due to modern agriculture, the huge numbers of human bred livestock like cows, pigs and sheep and due to the fact that we have dogs, cats and other domesticated animals, the number of animals belonging to those few species of domesticated animals exceed the number of all other animals taken together by far. Then there are of course animals like rats, cockroaches and certain insects that live off human bodies and human garbage and flourish by doing so. The largest number of individuals per species can be found in the realm of germs and viruses. They adapt by turning us into their prey in the breakneck evolutionary development that we have caused – which is, by the way, extremely counterproductive for us. Nobody can tell where all this might lead to, but many of the ecologists who publish on the issue tend to suspect negative rather than neutral or positive effects for all living creatures, including for human beings themselves. A deterioration and impoverishment of the gene pools, weaker immune systems and rapidly spreading pandemics might be the catastrophic scenarios caused by the uncontrolled growth of the human species and of those profiting from human civilization at the expense of all other species.

Animal protection motives

The extinction of wildlife and the modern production of meat, milk, eggs, etc., is considered by many people as grotesquely cruel and revolting and as one of the most visible undesired effects of the evolutionary dominance and growth of the human population. With six billion humans on Earth, there is just no other way of providing all of them with proteins from animals than
the cruel industrialized production of meat and other animal products or with total vegetarianism. With 6 billion people demanding living space for roads, housing, factories, agriculture, urban areas, etc., at low cost, it is becoming increasingly difficult to protect wildlife that cannot be integrated and domesticated easily by human civilization. Larger wildlife animals are endangered by humans penetrating and destroying their habitats. This is why today elephants, gorillas, tigers and leopards probably have little chance to survive in the wilderness in the long run. The absolute dominance over big animals – many of them carnivores that used to be a major threat not so long ago in human history - has recently produced strong feelings of empathy for these animals in the educated elite of Western countries. This feeling of animal rights adherents sometimes has as a flip side the feeling of guilt mixed with the rejection and negative attitudes directed against the evolutionary success of Homo sapiens.

Environmental concerns about the human habitat

There are many people today who believe that the over-use of natural resources of all kinds by Homo sapiens could have extremely harmful effects not only on other species but also on the future of Homo sapiens himself. This is by far not limited to the relationship of Homo sapiens in the realm of animals or plants. Even though neither the Malthusian predictions of the 18th century nor the projections of the famous 1972 study „Limits to Growth“ have materialized so far, the sentiment that there has to be such limits in principle still prevails amongst the middle aged intellectuals of the Western World. There are numerous news reports about floods, desertification and about greenhouse gases causing climate changes, etc., brought by Western media into every household almost every day. These effects are quite often portrayed to be self-inflicted harm produced by Homo sapiens with highly damaging effects out of greed, short-sightedness and ignorance. These reports have created during the last 30 years in the heads of millions of well educated people around the world a deeply rooted idea that humans might be not smart enough to assure their own well-being in the long run and may become extinct as a non-functional species very soon.
5.3.3. Moral Frustration

„Homo sapiens Might be technologically Clever but when it Comes to Wisdom, Morality and Social Behavior, He is still Very Primitive“

„With our brains, we are equipped to be doomed because of our natural greed”: „Homo sapiens are in reality too stupid and too much emotion-driven to be a survival model for a long time;” this is how the belief goes. Examples from the realm of animals show that many species have multiplied until food or other natural resources became insufficient and then the population size was corrected by nature. This might happen to Homo sapiens as well, except that it does not have to be food in a narrow sense that will become a cause for extinction, it could, for example, also be the involuntary creation of an ice age through climate change. Homo sapiens might already be on his way out and be gone soon. There is no shortage of apocalyptic scenarios coming out of Hollywood and many of them assume self-inflicted extinction of the species Homo sapiens. Greed, short-sightedness and the silly and egotistical belief that „I personally/ my family/ my generation/ etc. will surely find a way to get away with this“ is part of the Homo sapiens natural predisposition and will eventually kill all of us.

„With our brains we are equipped to be doomed because of our natural aggression“.

Another belief goes like this: Just look into any higher quality newspaper of your choice on any day of your choice and you will find out what human existence really looks like. Threats of extinction come from nuclear or biological warfare is a constant possibility considering the fact that there are constantly armed conflicts going on in the medium range level. The fact that there were several hundred wars after WW II alone will make you realize that mankind will never learn. Such conflicts could turn nuclear or biological at any time once those capabilities have spread. And then there are the more hidden but not lesser cruelties in the torture chambers of gruesome regimes or the cruelties that we do not immediately think of - in marriages and at the work place, for example. If all this does not lead to our extinction than at least it means that we are doomed to be unhappy because we just cannot stop being so violent and so mean to each other.
“We are still emotionally immature and this, in combination with our technical skills, makes us dangerous”

The title of William Allman’s book *The Stone Age Present* (the German title of this book could be translated as „Mammoth Hunters in the Metro“) really says it all: we have learned to develop all kinds of technologies due to the increased capabilities of our cerebral cortex, but our amygdale, our hypothalamus and the other, more ancient parts of our brain that govern our emotional life and, thus, our motivations, have not developed along with it. Thus, we are not much different emotionally to what we would find in apes or in wolves. The Latin saying „homo homini lupus est“ is very telling indeed. This is why we are doomed to extinction or constant unhappiness by our own biology.

This description is at first sight very modern species pessimism. On second glance, it follows the line of thinking of an ancient philosophical discussion that has been at the core of many ethics studies before. The question whether humans are by nature „good“ and this trait just has to be promoted or whether they are by nature „bad“ and therefore they have to be controlled by morality. This discussion is not our problem here; the interesting fact for us about the modern day version of this discussion is that those who say humans are by nature bad will more likely be inclined to change this very nature of Homo sapiens by GEHB. „To fix it,“ so to speak, just like a faulty car needs to be taken to the repair shop.

5.3.4. The Strive for Constant „Technical“ Improvement: „Homo sapiens Might be a Good Basic Model, but there is a lot of Room for More Improvement“

In 2003 the prestigious magazine „Scientific American“published a special edition that was focused on the evolution of Homo sapiens. Interestingly, this very special edition also contained an impressive example about fixing the „flaws“ of the human body that exhibits the underlying attitude very well. On the last few pages of this magazine, Jay Olshansky, professor at the University of Illinois in Chicago, points out some of the „flaws“ that evolution left us with and he also suggests what the „fixes“ would have to be, if we wanted to have better bodies that are then able to live longer and more healthily. (See next three pages):
Flaws

**EAR WITH FRAGILE TRANSMITTERS**
Hair cells of the inner ear, which relay sound information to the brain become damaged by exposure to loud noises.

**WEAK LINK BETWEEN RETINA AND BACK OF EYE**
This frail connection exists in part because the optic nerve which carries visual signals from the retina to the brain, connects to the retina only from the inside of the eye, not from the back.

Fixes

**ENLARGED MOBILE OUTER EAR**
Would collect sound with greater efficiency, to compensate for internal breakdowns.

**MORE PLENTIFUL AND DURABLE CELLS**
Would preserve hearing longer.

**OPTIC NERVE ATTACHED TO BACK OF RETINA**
Might stabilize the retina’s connection to the back of the eye, helping to prevent retinal detachment.

**RAISED TRACHEA**
Would help food and drink to bypass the windpipe more effectively. This design would need refining though, because it would disrupt breathing through the mouth and the ability to speak.
Flaws

**BONES THAT LOST MINERALS AFTER AGE 30**
Demineralization makes bones susceptible to fractures and, in extreme cases, can cause osteoporosis (severe bone degeneration), curvature of the spine and "dowager's hump")

**FALLIBLE SPINAL DISKS**
Years of pressure on the spiny disks that separate the vertebrae can cause them to slip, rupture of bulge; then they or the vertebrae themselves, can press painfully on nerves

**MUSCLES THAT LOOSE MASS AND TONE**
Such atrophy can impede all activities, including walking. In the abdomen, hernias can arise as the intestines (always pulled by gravity) protrude through weak spots in the abdominal wall. Flaccid abdominal muscles also contribute to lower-back pain.

**LEG VEINS PRONE TO VARICOSITY**
Veins in the legs become enlarged and twisted when small valves that should snap between heartbeats...malfunction, causing blood to pool. Severe varicosities can lead to selling and pain an, on rare occasions to life-threatening blood clots.

**RELATIVELY SHORT RIB CAGE**
Current cage does not fully enclose and protect most internal organs.

**JOINTS THAT WEAR**
As joints are used repetitively through the years, their lubricants can grow thin, causing the bones to grind against each other. The resulting pain may be exacerbated by the osteoarthritis and other inflammatory disorders.
Fixes

SHORTER STATURE
Would provide a lower center of gravity, perhaps preventing the falls that often fracture demineralized bones.

FORWARD TILTING UPPER TORSO
Would relieve pressure on vertebrae, thereby lessening the risk of ruptured or slipped disks, which contribute, along with weakening abdominal muscles, to lower back-pain.

CAGE WITH ADDED RIBS
Could help prevent hernias and other problems by holding organs in place more effectively.

CURVED NECK WITH ENLARGED VERTEBRAE
Would counterbalance the tilted torsis and enable the head to stay up and face forward.

THICKER DISKS
Would resist destructive pressure.

THICKER BONES
Would protect against breakage during falls.

EXTRA MUSCLE AND FAT
Would add weight on the bones, which would help counter the effects of demineralization, they would also cushion bones against breakage.

KNEE ABLE TO BEND BACKWARD
Would make the bones less likely to grind and deteriorate, especially if the knee never locked in place. But the absence of a locking mechanism would make it harder to stand for very long, so further modifications would be needed.

LEG VEINS WITH MORE CHECK VALVES
Would combat the development of varicose veins.

Source: Scientific American Special Edition „Human Evolution“, 2003, pp. 94 – 100
Prof. Olshansky did not go on to offer any suggestions as to how the flaws of the human brain could be fixed, maybe because this would have added the controversy about what those flaws might be to an approach towards the human body that is already highly controversial in its basic paradigms. There are probably many people who would strongly disagree and be disturbed and disgusted with the pictures presented above, and who would not only doubt the technical correctness and technical feasibility of this line of thinking. Many people would also feel very uneasy about this lack of respect if not directly for a creator of some kind, then at least for the more intellectual concept of „wisdom of nature.”

Should we really tinker around with evolution with such a degree of self confidence? With „Mother Nature,” who has made us the most powerful species on the planet? With a system that is so magnificent, so old, and so breathtaking in its history and its results – after all it has produced us, Homo sapiens? Goethe’s Dr. Faust and the story of Frankenstein are all outflows of this fundamental respect for nature and implicitly or explicitly the respect for evolution is part of this attitude. The message is always that we should not mess around with nature because this will warrant horrible repercussions.

By contrast, Olshansky’s article implicitly suggests that there are in principle no reasons to believe that we cannot „outdo” natural evolution and that it is absolutely worth it to think about what could be done and how.

5.4. The Rules of Evolution

5.4.1. Darwin's Theory and the Philosophical Earthquake it caused

In 1859 Charles Darwin published his theory about evolution in his famous book „On the Origins of Species by Means of Natural Selection or the Preservations of Favored Races in the Struggle for Life.” Darwin had hesitated to publish his theory for a long time, not only because he wanted to collect more evidence, but because he had anticipated the fierce resistance against his ideas that did indeed follow the publication of his book. The thought that human beings were not separately created by God in a big-bang type action some
5,000 years ago as the Bible claims but instead grew out of the same living material that all plants and animals developed from, was just too insulting for most people in Great Britain of the 19th century. How can we be related to dinosaurs and fish? And besides, the period of time needed for evolutionary changes is hard to fathom, even for those who believe in Darwin's evolutionary theory.

Today, probably most of the well-educated people on earth regard the scientific theories of evolution that can be traced back to Charles Darwin as a well-founded truth. A study of the magazine Science in 2006 (Science Vol. 313, pp. 765-766) researched the opinion of the general population (so not only of the more educated ones) in 32 European countries, including Japan and the United States. Only in Cyprus, Turkey and the United States did more people doubt or reject the idea of evolution than those who claimed that the Darwinian view was true. As I have indicated above, even the Vatican concedes now that the evidence in favor of the evolutionary theories is overwhelming and that – if the creation story of the bible is not taken too literally – both theories can be made quite compatible. For me it is hard to imagine that this might change again and that, for example, a radical fundamentalist movement like the creationists in the United States could regain dominance in their insistence that the wording of the biblical creation story has to be accepted in its literal form. What will probably remain a matter of consideration for a large number of people, though, is the question of whether at some point in evolution developments were purposefully initiated or manipulated by some divine power as the Vatican claims, or whether all evolutionary development is indeed solely based on the chain of random coincidences that scientific researchers have been able to detect so far. In brief, overriding basic philosophical questions like „Is there a God? “and „If there is a God, did he create us?“ and „If he created us, are we allowed to change this God’s creation?“ All of these questions still loom in the background.

But even if Darwin’s theory is philosophically interpreted in a way that we are coincidental products of a system that just runs by itself without external interference, it also has a few comforting, maybe even appealing sides to offer to the species-conscious and self-confident humans. These have made the theory bearable to them after the first shock of insult had faded away. There is, for example, the theorem of the survival of the fittest. If this theorem is correct and since Homo sapiens are the absolutely dominant species
on Earth, well then, we must be the fittest, the "winner" of the evolutionary race. That is not so bad, is it?

The idea of Homo sapiens as the "climax of evolution" was also raised by Darwin's theory. This implies that no further growth in "evolutionary quality," no further development and no improvement by evolutionary processes is even remotely conceivable because of our obvious and ultimate superiority over every other form of life on Earth. So maybe we were not created by God, but we are definitely a product of nature as a system that has a similar spiritual status as a "quasi-God" of the scientific age so to speak. And this system has created us to be the rulers on Earth. If we see it that way, then what is left are more the highly theoretical questions of whether there is a God or not, etc. and not the very practical issues of us having to give up our satisfactory feeling of being number one.

5.4.2. Modern and Upgraded Versions of Darwin's Theory of Natural Evolution

In 1999, 140 years after Darwin's On the Origins of Species... came on the market, Steve Jones published his book Darwin's Ghost. In it, he claims that most people might have accepted in principle the evolutionary theory that can be traced back to Darwin's publication, but that they nonetheless do not really understand it. Besides, he says, many of the findings about its mechanisms that have accumulated over the last 140 years since Darwin's theory was published did not really make it into the minds of people, not even of the well educated ones.

Since genetic engineering is a purposeful deviation from natural evolution, it is absolutely worth it to invest some thought in what natural evolution really is, how it works and what its "output" is. After all, this could be one way of seeing it: if you reject genetic enhancement by human intervention, then natural evolution is what you are left with. Shouldn't anyone who wants to make a qualified choice between the two try to find out more about the available alternatives? What is it really that the enemies of genetic enhancement want to keep so badly? What is it really that the proponents of genetic engineering have so little respect for and want to outdo artificially?

The core of the evolutionary process is the so-called "natural selection," but this mechanism has to be understood properly: not the question of selection
but the two dimensions of mutation of genetic material on the one hand and of the reproduction rate on the other is the crucial factors.

**Mutation of Genetic Material**

Mutation of genetic material happens due to external influences imposed on the fragile strings of DNA. The origin of the influence could be manifold: heat, cold, radiation, chemical influences ... all of these factors may lead to a change of base molecules or to an alteration of the copying process or to other types of disturbances that will cause the DNA of an individual to not produce exactly the same proteins as before. The effect of the external mutation influences may be a total knock-out of a certain gene, or it may lead to alterations in the protein output and thus to the production of different numbers or types of cells. As long as these mutations occur in adults, the effects will still be visible but will be relatively minor since only a small portion of cells are renewed on a regular basis. The younger a living creature, the more such mutations will play a role in its development, since the speed of cell production is much higher in the younger years.

The crucial event for the evolutionary process, however, is the mutation of reproductive cells. To be exact, in the case of human beings, the mutation of the DNA that is contained in the core of the egg cell of the female or in the sperm cell of the male human and that is passed on. Once these specific cells containing the altered DNA are part of the reproduction process by the sperm fertilizing the egg cell and by the formation of a new embryo, then a new evolutionary trial run has begun. If the DNA of the fertilized egg cell and/or if the DNA of the sperm cell that fertilized the egg cell were altered by natural mutation, the resulting children will differ from their parents in the trait that is produced by the altered gene. We can all observe the consequences without being scientists when we look at children and compare them to their parents. Children might have brown hair instead of the blond hair of their parents, green eyes instead of blue ones, the nose might be longer or stubbier, the child might be either dreamier or more dynamic than the mother or father, etc. In brief: children are not exact copies of their parents.

Human beings have around 3 billion elements on their DNA string of which around 20,000 to 30,000 contain relevant genetic information. The natural rate of alteration is some 20,000 DNA elements on average per year, so only less than one in a hundred thousand. This does not sound like a lot, but when the mutation does hit a DNA element that is relevant for passing on
genetic information, then the resulting consequences of a single base element altered could be quite substantial and a very small cause can then have a big effect.

The fertilized egg cell has to nestle in the womb and many biological conditions have to be fulfilled for a problem-free development of the embryo. If nothing goes wrong in the womb, then the embryo will be born as a new human being nine months later. The brain will still grow for another two years after the birth until it has reached its full size. This is why human babies are relatively underdeveloped and are outdone by adult chimpanzees in terms of cognitive powers until they are about 18 months old.

The likelihood of conception is actually quite low. Only a few days per month is the female human being able to provide a fertile egg and only 25% of all attempts to conceive during these few days succeed. Of the embryos, only a certain percentage make it to grow to the size of a baby. Even today with modern medicine working hard on it, not all babies survive the stressful birth procedure and the few days afterwards. What the ratio of birth deaths was in prehistoric times is hard to say, but the conditions in very poor developing countries might give us a vague idea. The following report quotes were taken from the website of the news channel news 24.com (http://www.news24.com/News24/Africa/News/0,,2-11-1447_1601878,00.html dated of report 08/10/2004 11:49):

„United Nations - One in four children in Sierra Leone dies before age five, and one in 10 in Iraq. Across the globe, poor care for newborns, malaria, diarrhoea, malnutrition and even measles snuff out lives before a fifth birthday, according to a United Nations report released on Friday. ... Child mortality refers to the number of children who die before their fifth birthday, and is measured per 1,000 live births. In 2002, industrialized countries had seven deaths per 1,000 births, while the poorest nations had 158 in every 1,000 births.“

The Reproduction Rate

Let us suppose a baby carrying a new gene variation is born and has made it to age five. It can still by no means be sure whether it will be able to pass on the new genetic material that was contained in its parents' fertilized egg and is now present in all of the cells of the body of this child. This will only be possible if and when the child makes it to reproductive age and then actually succeeds in reproducing.
In the animal world the main survival problems in younger years include attacks by predators or by angry and jealous rivals within the own species and equally dangerous attacks by microbes that cause infections and diseases with a fatal outcome. But even when reproduction age has been reached and the creature carrying the new DNA model is still alive, that does not mean that reproduction automatically happens. There might be no mate available or there might be fertility problems of the mating partners, or there might be unlucky events like floods or storms, wiping out all of the offspring, etc.

The notion of natural selection implies for the badly informed non-scientist a rational process in which the individuals with the „highest-quality“ DNA will also certainly produce the largest number of children. Indeed, this is the basic principle on which Darwin’s evolutionary theory is based: a constant trial and error procedure with the average long term result that individuals whose DNA produces preconditions for a higher degree of adaptation to the existing environment will more likely be able to produce higher numbers of children than other individuals where the adaptation to the environment exists to a lesser degree. But this is only a basic principle that influences long term probabilities. The principle does by far not determine the outcome of each individual reproduction case or even of the development of a whole species over a very long period of time.

It is also debatable whether it is really justified to speak of a development towards a „higher quality“ gene pool at all; it is very hard to tell what „higher quality“ and what „superior“ are supposed to mean. Superiority in evolutionary theory cannot be more than a purely situation-oriented statement: warm fur might be good in an ice age, but in the desert it would be a painful and deadly burden. In different situations, there are different needs and, thus, also different genes are more preferable and „superior“ and absolute measuring sticks that are valid all the time just do not exist.

5.4.3. Doubts about the Wisdom in the Rules of Evolution

„Evolution does not have a Recognizable (Ethical) Goal“

From all of the facts provided above, some thinkers reach the conclusion that evolution might be a mechanism that is astounding in its complexity
and outcome, but that it is not sure at all that evolution is really a mechanism of „improvement“ or that evolution has any kind of „goal“ or „final destination“ at all. We can find out where we come from and how this happened, but by uncovering the rules of evolution we must realize that we have learned very little about where it might take us if we did not interfere. Evolution, it seems, is in the end a set of rules that are stubbornly applied no matter what the outcome is and whether this outcome „makes sense“ and is „desirable“ from the perspective of any neutral but ethically minded observer is irrelevant for the system. This certainly also refers to the one outcome of the evolutionary developments that is called Homo sapiens. Just as there is a discussion about the question whether there is a recognizable goal of political history, there can also be a discussion on whether the biological history that produced Homo sapiens has a goal and strives towards a purposeful end and some thinkers - by looking at the latest scientific evidence - claim it is naïve to assume so.

Thus, for these evolution-skeptics the process of evolution not only does not have a recognizable final destination, for them evolution is also an ethically and normatively completely neutral system. For example, if thin-fur wolves for some reason succeed in reproducing more often than thick-fur wolves during an ice age, then the result will be a growing and larger number of wolves that suffer from being cold all the time. Even worse than that, evolution has the inherent feature of causing pain over and over again because it produces maladapted living creatures over and over again. The principle of survival of the fittest inherently means that there exist a large numbers of unfit creatures alive at any point in time who have to suffer tremendously and eventually will even fail to reproduce, thus allowing the modification of the gene pool. The evolutionary system entails cruel experiments with living creatures that are very much able to feel pain by giving them those features that will cause suffering. Evolution is definitely not a pain-avoiding system, not a very efficient one at least. Because it takes painstakingly long until the adaptations to environmental necessities take place and it takes sometimes millions of painful failures to find out which kind of variation is really the most suitable one. Thus, in a way, evolution is also a quite primitive system.

So what does all that have to do with GEHB?

The interpretation of the scientific facts that we know about the rules of evolution contain a potentially major blow to those who have gotten used to the comforting thought that Homo sapiens is the generally superior result of the
wisdom of nature. Recognizing this, in turn, might result in a loss of respect for the wisdom of nature and might, as a consequence, automatically make GEHB look somewhat more acceptable. In his classic 1998 book *Remaking Eden*, the geneticist Lee Silver formulates his opinion about the respect for the wisdom of evolution like this: „It is wrong to tamper with the natural order: This concern is expressed by many who are not particularly religious in the traditional sense. Still, they feel that there is some predetermined goal for the evolution of humankind, and that this goal can only be achieved by the current RANDOM process through which our genes are transmitted to our children. However, unfettered evolution is never predetermined, and not necessarily associated with progress – it is simply a response to unpredictable environmental changes. If the asteroid that hit our planet 60 million years ago (that killed the dinosaurs) had flown past instead, there would never have been any human beings at all. And whatever the natural order might be, it is not necessarily good. The smallpox virus was part of the natural order until it was forced into extinction by human intervention. I doubt that anyone mourns its demise.“ This quote hits the nail right on the head.

„The Wisdom of Nature in Securing our Survival as a Species is Questionable“

If evolution does not have a goal and if its trial and error cycles are as long term as they seem to be, then maybe Homo sapiens is not as safely positioned as a sure survivor and an assured superior creature as it seems either?

Homo sapiens might be the winner in the competition with other animals today, but this might change. For example, we might lose the race against hostile microbes, with their much shorter generation cycles and with a much higher adaptation speed than the one of our immune system. HIV gives us a glimpse what could be in the waiting. Homo sapiens might also not be quick enough in adapting to radical changes of our environment. There are all kinds of fiction and non-fiction theories out there now that suggest that we might become extinct one day because of the hit of a big meteorite, because of a change in the power of the sun’s radiation, because of the appearance of a powerful and fast traveling virus or because of man-made catastrophes like nuclear wars or radical and sudden climate changes. There are numerous unpleasant scenarios that could all lead to the extinction of Homo sapiens. Life on Earth only a few hundred million years ago
would have been impossible for us due to the content mixture of the atmosphere back then. Nothing tells us that such a situation will never come again in the future.

So we are much more fragile than we think. The face of our planet was habitat to millions of species that appeared and then disappeared again. The more one thinks about it, the more it appears likely that Homo sapiens will be just another one of them at some point in the future. If this is true then is it really wise to trust in whatever the „lottery of nature“ provides us with?

„The Wisdom of the Design of our Brain is Questionable“

Not only when it comes to the future survival of the species as a whole, but also when it comes to the philosophical judgment about the results of our evolutionary history, there is a mixed bag of aspects waiting for us. This was already discussed in length from another perspective above, so a brief summary will suffice here:

Who says that having a brain with a huge cerebral cortex that provides us with enormous technical cleverness thrown over the ancient emotion-producing parts of our brain as an additional layer is really the ultimate wisdom of brain design? Would we really choose having exactly a brain of this kind if we could go back in a time machine a few million years into the past and manage the initial evolutionary process?

There are very plausible theories claiming that the development of technical cleverness is an almost inevitable result of the existing evolutionary rules because technical capabilities are a good thing to have for survival, for competing and, thus, for having a higher reproduction rate. But as outlined above, these technological capabilities have a negative flip side to them as well (ecological destructiveness, military technologies, etc.). People like Stephen Jay Gould even make the bold statement that evolution has not always progressed by adding complexity and thus arriving at the final stage of producing intelligent beings but, in the contrary, has also rewarded species that developed forward by simplifying!

Would we really have chosen to be pushed around by emotions all the time, would we have chosen emotions as our main motivators at all or would we have preferred a more reliable basis for our decision-making? Would we have chosen a brain structure that brings about a constant painful tension between emotions and thoughts, rational conclusions and hard-to-control
desires, moral duties and sometimes overpowering 'immoral' wants and needs?

Would we have chosen the development of a rational mind at all? Or would we maybe even have said „thank you, but no thank you“ to all the fancy possibilities of a huge cerebral cortex and rather remained in the cozy limitations of unconscious instincts if we had known all the consequences to come? Is ignorance bliss or not? Would we have preferred the implanted altruism of ants and bees to our individual mental freedom and to the constant necessity to make difficult choices? Would we really have followed John Stuart Mill in his statement that it is better to be an unhappy human than a happy pig? We shall come back to this question later.

We have reached the deep waters of philosophical thinking about our existence here and are completely left alone by scientific facts in our search for answers. The rules of evolution will not help us in finding this answer, this is for sure.

5.5. Summary and Conclusions

With the discussion about evolution, its rules, its goal and its purpose going on vividly amongst biologists, the philosophical dimension of this discussion should not be underestimated. Deep in our souls many of us Western people take comfort in the theory of either God having created us and having put us in a separate category or „nature“ and the „natural system of evolution“ having done this job by putting us, Homo sapiens, on top of the hierarchy of life for all eternity.

Needless to say, any claims that evolution is chaotic or of evidence that questions this perceived human primacy is implicitly challenge this anthropocentric view that has become an important element of human self respect. This is the reason for these views and for the very thorough scrutiny or even fierce denial of these pieces of evidence Any claim that other species and their survival strategies might be more successful than ours is an insult and a slap in the face of people who feel they belong to the most special category of living creature that the universe has ever seen. Any doubt about the special position of humans in evolutionary development might also lead to fundamental questions about human dignity and human rights as we have
seen in a previous chapter. Any scientific theory about the species Homo sapiens becoming extinct at some point in the future like so many other species before (see for example the 2002 bestselling book *The Life and Death of Planet Earth* by Peter ward and Donald Brownlee) is to many people either emotionally unbearable or blasphemy or both – in the end the possibility of Homo sapiens becoming extinct at some point in the future also questions the perception of our special position in the universe that many of us have become so fond of.

Concerning the meaning of the discussion about evolution for the ethical discussion about GEHB, this must be put this in the proper perspective. The discussion about genetic enhancement is a side arm of the large stream of intellectual debate about the role of humanity in the universe and not the other way round.

The effects of what you as an individual believe about evolution will determine to a great extent what your basic and fundamental attitude towards genetic enhancement will be:

- If you believe in evolution being a perfect and „holy” process you will tend to think that the outcome Homo sapiens is somewhat „holy” and „untouchable” as well.

- However, if you think that evolution is a stupid and mechanical system based on random trial and error, then you will tend to not regard its products as perfect and untouchable, including human DNA. Then you will search for other pros and cons concerning genetic enhancement and most likely more utilitarian and more technical (e.g., safety) considerations will gain dominance in your ethical decision-making.

The next chapters will show what kind of arguments in favor and against GEHB this latter category of people will find.
6. CULTURAL EVOLUTION AND TECHNOLOGY POSITIVISM

The website http://socio.ch/evo/index_evo.htm of the sociology department of the University of Zurich, Switzerland gives an extensive list of publications on the topic of cultural evolution that also shows that many intellectuals have dealt with the topic, but they have often understood very different things when talking of „cultural evolution.“

In this chapter, the term „cultural evolution“ will be used to explain the relationship of technology positivism in relation to the ethical evaluation of GEHB which can be summarized as follows: the fact that cultural factors do influence the biological evolution of the species Homo sapiens is for many proponents of genetic enhancement a reason to claim that „natural“ evolution in the Darwinian sense does not exist any more for humans. As a consequence, they say, we would be manipulating something by applying GEHB technologies that is far from being an „untouched, natural creature.“ Cultural evolution is for many a reason to regard genetic enhancement as just another logical step in a development of Homo sapiens that has been going on for a few tens of thousands of years and has reached a considerably scope and depth in the early 21st century.

Let me portray this position by going forward step by step in its intrinsic logic.

6.1. „Homo sapiens Has Detached himself from the Rules of Natural Evolution by Means of Culture“

Genetic mutations also happen within the cells of human beings who are alive today. They happen every day even now. As I write this and you read this, the DNA of all of our cells is the object of alterations by environmental influences like natural radiation, heat, nutrition, etc. and the same is true for the egg cells or the sperm cells that your children grow out of. The gene pool of the species Homo sapiens is, thus, still developing with slight muta-
tions happening from one generation to the next as it always had been. There is simply no realistic way to avoid this constantly ongoing development of genetic mutations– and there is also no good reason to do so. The only difference between a 21st century Homo sapiens and all animals or plants living in the wilderness is that in the case of modern Homo sapiens, the reproduction rate is almost completely detached from the survival qualities of almost any human individual. At least in Western countries this is the case, where almost no natural weakness can be grave enough to keep people from having sex and reproducing. The vast majority of babies born are kept alive by means of modern medicine and no relevant numbers of deaths occur before reproductive age. There are only a few biological factors in existence today that will prevent people from reproducing as much as they want to, regardless of their genetic material. Even genetically caused infertility is just a small barrier nowadays that can be overcome in most cases through modern reproductive technologies (see above).

If there were no contraceptives and no abortion, the average woman would be fertile during some 30 years of her life and would probably produce an average number of 8 – 10 children, just as was the case in developing countries during a large part of the 20th century. Any couple and even single parents can today have the number of children suitable to whatever emotional desires, economic conditions and philosophical values they might apply to making their reproductive decisions. Genetic constitution almost never has anything to do with this any more. Individuals with genetically caused handicaps, genetic diseases, a predisposition to allergies, low intelligence, etc. will also most likely survive until reproductive age and will be able to reproduce unless they are really irreparably infertile or unable to find a mate. On the other hand, it is not assured at all that humans whose genes have provided them with a fantastic immune system, resistance to cold, heat, environmental toxins, or with superior intelligence, memory and emotional stability, etc. will have more children than others. In prehistoric times the depletion of the ozone layer would have led to a lower reproduction rate amongst those whose skin is more sensitive to the harmful radiation that it lets through – today people have sunglasses to protect their eyes and sunscreen to protect their skin. We stay inside most of the time anyway. In prehistoric times those with a genetic predisposition to adapt to group life had a higher chance to survive and reproduce and therefore genetic determination to altruism was on the rise (see Shermer, 2004, pp. 25-56). Today no such regulating mechanism exists. In fact, highly testosterone-driven and
anti-social individuals have the possibility to conceive as many children as they wish as long as they find mates who will consent to have a large family with them. No driving factor for an improvement of the gene pool is in sight for modern humans. Cynics even claim that the opposite might be the case: those who are smarter are too smart to have many children and, therefore, the quality of the general gene pool of the human race is on its way down.

Thus, one of the two rules of evolution – the adaptation to specific environmental conditions by restricting the reproductive rate of poorly adapted individuals – no longer applies to the species of Homo sapiens. The development of the gene pool of Homo sapiens today follows almost exclusively cultural factors and not biological ones. For over 95% of the 130,000 years of the history of Homo sapiens all the rules of natural biological evolution as described above used to be valid more or less for Homo sapiens as well. The evolutionary situation of Homo sapiens used to be no different to the one that a tree or a mouse or any other living creature was in. But in particular during the last 200 years things have changed dramatically. This does not sound politically correct at all, but before you pump up your indignation please accept that this is not to suggest that the new rules according to which the human gene pool is developing are all bad, or that this situation is dangerous and that there is any reason to worry or that something should be done about it. This is simply about attitudes about evolution that have an immediate effect on attitudes about GEHB.

It seems that many of those thinkers who have gone through the above analysis have come to the following argument: „Since we have already removed ourselves from the evolutionary process, why shouldn't we be allowed to take evolutionary adaptation into our hands deliberately and purposefully instead of allowing a mindless process to remain in the driver's seat?“
6.2. „Homo sapiens has Gone so Far in Cultural Evolution and Technological Development – GEHB is just the Next Logical Step“

6.2.1. „Human Beings today are already Technologically Enhanced Creatures“

If we could secretly observe the daily life of any upper middle class household in Europe or in the United States today this is probably what we would get to see: a stone house packed with technologies from heaters, electric lights, household machines, cars, etc. People who wake up in the morning, toast bread, brew coffee, squeeze oranges for their juice in electrical machines, who take vitamins and mineral pills that provide a daily portion of the most important nutrients, brush their teeth with toothpaste, put on their clothes, put the miniature speakers of their cell phones or their MP3 players into their ears and go to work or school in equally high-tech environments. There they have projectors, telephones, Internet access, printers, cafeterias, elevators and air conditioning. Those people might go skiing by helicopter or by ski lifts on the weekends, they might go to amusement parks with roller coasters or they might go to see a 3D movie in a high tech movie theater. Those people might have a few little weaknesses that they take care of with technological aids like glasses to enhance vision (unless the eye default has been corrected by a laser operation), or hearing aids to enhance hearing and some of them might have a transplanted kidney, a pacemaker for their heart or an artificial hip or artificial teeth.

Those aids they may need because they have enhanced their longevity to an incredible 75 years on average while it used to be only one third of that – some 25 years of average life expectancy – only a few thousand years ago. They use infrared for night vision and x-rays for diagnosing their bones, they implant amalgam (English?), gold and porcelain into their teeth and some of them have their nose straightened or fat sucked out of the upper thighs or double chins in order to look better. When those people cannot sleep they might take valium, when they need energy for an exam they take calcium and vitamin C tablets at best, many drink a lot of coffee and many drink alcohol to loosen up and become more sociable during a party. Ritalin, Prozac and Modafinil were already discussed above, but the most com-
mon drug for the lower classes around the world today is probably nicotine. More and more women take pain killers during birth and some even watch TV while their baby is being born. And of course there are numerous strong (and illegal) drugs floating around the world markets that some people take secretly, from cocaine to heroine to morphine. The latter one is also given as a strong pain killer in hospitals to make pain-free dying easier for patients with terminal diseases.

By now it is probably clear where this is going. Seen from this perspective, human beings in the wealthy countries are already technologically enhanced beings. They have become that without really noticing, without thinking about it and without purposefully enhancement intentionally. And there is no doubt that humanity will go on into this direction with technology still advancing at a mind-boggling and seemingly with an accelerated speed and with the lower income classes of the world striving for the same lifestyle that the wealthy ones already have.

Many, such as James Hughes in his book *Citizen Cyborg*, argue that we have actually already become the „cyborgs“ that NASA scientists planned to develop in the 1960s to create the super-astronauts needed for long journeys into space. In 1960 NASA gave two scientists the task to brainstorm how astronauts could be more adapted to outer space. The two came up with wide ranging ideas from built-in drug infusers to delivering stimulants, anti-nausea and anti-psychotic drugs on demand, control units for the heart beat and other body functions, like artificial lungs. (See Hughes, 2004, page 100)

A vast majority of people also do not hesitate to impose the technological enhancements that have become so common to all of us living in rich countries on their children. Most of us have no doubts that we act as surrogate decision makers in the best interest of them. For example, dental braces have never been questioned in their risk-benefit ration. Quite the contrary: parents’ who refuse to correct their child’s unfavorable natural set of teeth due to philosophical principles would most likely provoke a frown or an angry headshake from most citizens of Western countries. Likewise, the introduction of certain obligatory vaccinations for every child in some countries shows the direction that this thinking is going: „We cannot hope to gain immunization towards certain viruses through evolution killing all of those who catch the bug before they can reproduce. Thus, we have to find a technical solution by developing vaccinations and force unwilling parents to give them to their children for the general good and that of their children.“
This logic has developed over a lot of time and in a quite unspectacular and relatively conflict-free way.

To a technology positivist there is no reason to doubt that this is good and is part of „human nature.“ They point to the factual behavior of human beings, show demand statistics of market research and may ask questions like „who wants to go back to Stone Age?“ Or as McKibben puts it when talking about longevity: „Arguing against expanding the average life span is like arguing against ice cream.“

Seen from this perspective and given this historic track record, is it no conceivable that maybe in one or two centuries, or perhaps already in a few decades from now nobody will make a fuss about certain genetic enhancements any more? Will they be considered a necessary measure to prevent evolutionary degeneration? If evolution is nothing more than a set of irrational rules with lots of random and „faulty“ output and lots of trial and error – maybe we shouldn't be so shy in trying to do it ourselves? And the argument could go much further than that: Maybe we can easily outdo the natural system and produce much better results. Look at the simple wings that nature has produced for birds and compare them with the sophisticated jet engines and helicopters that humans have built and you will understand the argument. This is the line of argumentation of convinced technology positivists.

There is already an ongoing discussion in biomedical ethics whether rather than a prohibition there is on the contrary, a moral imperative, especially for the medical profession, to apply germ line interventions if it is the best available technology. If it is found to be safe and there is no real good alternative, – how can a doctor who has the duty to heal deny a future child this technology? (This is, for example, discussed in the essay of Pilar Ossorio in Chapman, 2003, page 253). The problem of keeping a medical problem and the desire of enhancement clearly separated has already been discussed above.

In general, technology positivists are more inclined towards libertarianism when it comes to regulating or restricting the use of technology. There is some inner logic to this since only negative and dangerous things need to be regulated by the government while we usually regard positive things as something that can – or maybe even should - be freely used. In particular, technologies that are directed to the individual’s body provoke technology positivists to demand that there be freedom over the use and modification
of one’s own body. Often they include „reproductive freedom“ in this demand, even though reproduction involves at least one other individual, the child to be.

One of the most radical proponents of technology positivism in respect to genetic enhancements of humans is Max More.

6.2.2. The Mental World of Max More and his „Extropy Institute“

No other document outlines the thought of taking over from Mother Nature more boldly than Max More’s 1999 „A Letter to Mother Nature“.

„Dear Mother Nature:

Sorry to disturb you, but we humans—your offspring—come to you with some things to say. (Perhaps you could pass this on to Father, since we never seem to see him around.) We want to thank you for the many wonderful qualities you have bestowed on us with your slow but massive, distributed intelligence. You have raised us from simple self-replicating chemicals to trillion-celled mammals. You have given us free rein of the planet. You have given us a life span longer than that of almost any other animal. You have endowed us with a complex brain giving us the capacity for language, reason, foresight, curiosity, and creativity. You have given us the capacity for self-understanding as well as empathy for others.

Mother Nature, truly we are grateful for what you have made us. No doubt you did the best you could. However, with all due respect, we must say that you have in many ways done a poor job with the human constitution. You have made us vulnerable to disease and damage. You compel us to age and die—just as we’re beginning to attain wisdom. You were miserly in the extent to which you gave us awareness of our somatic, cognitive, and emotional processes. You held out on us by giving the sharpest senses to other animals. You made us functional only under narrow environmental conditions. You gave us limited memory, poor impulse control, and tribalistic, xenophobic urges. And, you forgot to give us the operating manual for ourselves!

What you have made us is glorious, yet deeply flawed. You seem to have lost interest in our further evolution some 100,000 years ago. Or perhaps you have been biding your time, waiting for us to take the next step ourselves. Either way, we have reached our childhood’s end.

We have decided that it is time to amend the human constitution.
We do not do this lightly, carelessly, or disrespectfully, but cautiously, intelligently, and in pursuit of excellence. We intend to make you proud of us. Over the coming decades we will pursue a series of changes to our own constitution, initiated with the tools of biotechnology guided by critical and creative thinking. In particular, we declare the following seven amendments to the human constitution:

Amendment No.1: We will no longer tolerate the tyranny of aging and death. Through genetic alterations, cellular manipulations, synthetic organs, and any necessary means, we will endow ourselves with enduring vitality and remove our expiration date. We will each decide for ourselves how long we shall live.

Amendment No.2: We will expand our perceptual range through biotechnological and computational means. We seek to exceed the perceptual abilities of any other creature and to devise novel senses to expand our appreciation and understanding of the world around us.

Amendment No.3: We will improve on our neural organization and capacity, expanding our working memory, and enhancing our intelligence.

Amendment No.4: We will supplement the neocortex with a metabrain. This distributed network of sensors, information processors, and intelligence will increase our degree of self-awareness and allow us to modulate our emotions.

Amendment No.5: We will no longer be slaves to our genes. We will take charge over our genetic programming and achieve mastery over our biological and neurological processes. We will fix all individual and species defects left over from evolution by natural selection. Not content with that, we will seek complete choice of our bodily form and function, refining and augmenting our physical and intellectual abilities beyond those of any human in history.

Amendment No.6: We will cautiously yet boldly reshape our motivational patterns and emotional responses in ways we, as individuals, deem healthy. We will seek to improve upon typical human emotional excesses, bringing about refined emotions. We will strengthen ourselves so we can let go of unhealthy needs for dogmatic certainty, removing emotional barriers to rational self-correction.

Amendment No.7: We recognize your genius in using carbon-based compounds to develop us. Yet we will not limit our physical, intellectual, or emotional capacities by remaining purely biological organisms. While we pursue mastery of our own biochemistry, we will increasingly integrate our advancing technologies into our selves.

These amendments to our constitution will move us from a human to an ultrahuman condition as individuals. We believe that individual ultrahumanizing will also allow us to form relationships, cultures, and polities of unprecedented innovation, richness, freedom, and responsibility.
We reserve the right to make further amendments collectively and individually. Rather than seeking a state of final perfection, we will continue to pursue new forms of excellence according to our own values, and as technology allows. Your ambitious human offspring.


Max More founded the „Extropy Institute“ in California in 1988, whose magazine is notorious for its radical views on technology advancement. Max More’s real name is Max O’Connor. The name change signifies what the mental program of Max More and his followers is: „Seeking more intelligence, wisdom, and effectiveness, an unlimited lifespan, and the removal of political, cultural, biological and psychological limits to self-actualization and self-realization. Perpetually overcoming constraints on our progress and possibilities. Expanding into the universe and advancing without end.“ (Hughes, 2004, page 166)

Max More's promotion of technological freedom and optimism rather than caution and restriction is best expressed in the „Proactionary Principle“ formulated to counter the „Precautionary Principle“ of traditional technology assessment: „People’s freedom to innovate technologically is highly valuable, even critical, to humanity. This implies a range of responsibilities for those considering whether and how to develop, deploy, or restrict new technologies. Assess risks and opportunities using an objective, open, and comprehensive, yet simple decision process based on science rather than collective emotional reactions. Account for the costs of restrictions and lost opportunities as fully as direct effects. Favor measures that are proportionate to the probability and magnitude of impacts, and that have the highest payoff relative to their costs. Give a high priority to people’s freedom to learn, innovate, and advance.“


The „Extropians“ are a group of mostly male (75% according to a 2002 survey, see Hughes, 2004, pp. 167-168) young, ultra-libertarian, ultra-hedonistic technology enthusiasts. Max More, thus, is not and does not want to be part of the mainstream. It would be easy to turn away from the radical thoughts he publishes with a shrug and a smile. And yet, what makes Max More so relevant is the array of more moderate mainstream variants of this line of thinking.
6.2.3. Sloterdijk’s „Menschenpark“

In 1999, the same year in which Max More published his „Letter to Mother Nature,“ Peter Sloterdijk’s book „Regeln für den Menschenpark“ („Rules for the Human Park“ whereby „park“ is understood here as a kind of open air zoo) came on the market and created some furor amongst the German intellectuals. Peter Sloterdijk is one of the two most well known living philosophers in Germany today. (The other one is Jürgen Habermas; both have been ranked high on the list of the 500 most influential intellectuals by the magazine „Cicero“ in March 2006 – i.e., people who frequently appear on talk shows, management seminars, etc., to give their view on things.) Sloterdijk’s words do have some impact and weight in Germany and maybe even Europe as a whole. He is part of the establishment and as such that middle and upper class people expect him to be intellectually creative, innovative and unusual in his presentations, for which he allegedly charges a few ten thousand Euros. The public debate on Sloterdijk’s „Regeln für den Menschenpark“ became very heated after Jürgen Habermas responded with an enraged counter-position, inspiring Peter Sloterdijk to publish another essay on the subject entitled „Menschentreibhaus“ („The Human Greenhouse“).

Why all the outrage? Sloterdijk reaches the conclusion that cultural evolution not only enables but almost forces humankind to take over the management of its own biological evolution. According to Sloterdijk his „self‐domestication“ has provided Homo sapiens not only with all the cozy advantages of technological civilization, but has also given him considerable powers over his self‐development by „anthropo‐technologies,“ such as those that parents, teachers and priests try to apply in their education efforts. With the perfection of these technologies, humans have moved increasingly in the direction of active selection. They have unwillingly become subjects rather than objects of species developing politics and action. „In reality,“ he writes (Sloterdijk, 1999, page 48) „what presents itself as thinking about politics is basic reflections about the operating rules for the human park.“ And: „...we have to make ourselves aware that the next long time span for humanity will be a period of species‐political decisions.“ Since it seems that schools and parents might lose the battle against the powers unleashed by violent movies and other media, the necessity of applying other means of „anthropo‐technologies“ might just be a logical step in the development that humanity has taken so far. This includes thinking about applying genetics in a pur-
poseful way: „Whether long term development will also lead to a genetic reform of the basic features of the species – if a future anthropo-technology will be extended to include an explicit planning of traits and features; if humanity as a species will be able to perform the change from birth-fatalism to optional birth and to prenatal selection – these are questions in which, however blurred and fearsome, the evolutionary horizon begins to become visible.“ (Sloterdijk, 1999, page 46; translation by Christian Gruenler).

Human beings have always strived to control their environment and done so more successfully than any other species. Sloterdijk quotes here the term of Hugh Miller who spoke of an „insulation from the pressure of selection“ (Sloterdijk, 2001, page 32) and thus „the human evolution happens mainly in an internal environment that tends to appreciate esthetic and cognitive superior variants“ (Sloterdijk, 2001, page 40). In turn, this „decadence“ has always had genetic and evolutionary effects in the history of mankind (Sloterdijk, 2001, page 47).

Sloterdijk denies that human beings are or ever have been the untouchable biological entities that religious thinkers want to make us believe. On the contrary, Sloterdijk claims that humans have always been „products“ and that even European religious traditions are in reality based on this concept: „Europeans have always regarded the human being as a product or as result of creation due to their dependence on the myth of Genesis.“ (Sloterdijk, 2001, page 17). For Sloterdijk it is not God who created humans but humans who created humans – without doing so intentionally.

It is easy to see why these published thoughts caused such an outrage in a country that has had disastrous experiences with opening up to the thoughts of intentionally designing humans by eugenics. On the other hand, the shock and indignation might just have been intended by a well known media personality deviating from the usual concert of rejection of genetic enhancement that does not invest a lot of thought or tolerate compromises. Today, a few years later, the excitement has already died down. When reading the text of Sloterdijk’s two books carefully it is actually not at all clear whether he was really promoting an ethical position or whether he was simply making a forecast. Taken as a prophecy, his two books simply say that humans as tool users will not suddenly stop ancient habits if we find tools to change our own genetic setup, which would just be another step in our long history of self-domestication.
6.3. **Transhumanist Visions Concerning GEHB**

6.3.1. **Problems of Definition**

Let us suppose that GEHB technologies were available for a wide range of applications and that there were no legal limitations in regard to their use – what would a proponent of GEHB then say should happen? Since much of the literature listed in the bibliography in the annex of this book is full of examples for genetic enhancements, the question seems to be easy to answer. However, if one wants to pinpoint a GEHB agenda of the pro-enhancement faction, this turns out to be more complicated. To do this, we first must select a source with the proper authority to speak for the proponents of GEHB, and then try to distinguish between enhancements of the brain and enhancements of the rest of the body. Finally, we must come up with a list of desired goals of brain enhancements. All three of these are daunting tasks.

„Transhumanism“ as the Speaker of Enhancement Proponents

There are many shades of proponents of GEHB, all of which may have completely different ideas of what enhancement means and what kind of enhancements are good or bad. To overcome this confusing and unclear picture I will for the rest of this chapter rather speak of transhumanists instead of proponents of enhancement. I will also use a very narrow – and admittedly fallible – definition: A transhumanist in the sense of this chapter is a follower of the World Transhumanist Association (WTA) whose views are fully represented by the views of the leadership of this organization in particular by the writings of its president Nick Bostrom or its secretary general James Hughes. So I will regard the official position of the WTA as the position of enhancement proponents even if this is admittedly, a simplification of the issue.

This is the official definition of „Transhumanism“ from the World Transhumanist Association (WTA) website (http://www.transhumanism.org/index.php/WTA/) dated March 21, 2006: „Transhumanism is a loosely defined movement that has developed gradually over the past two decades. It promotes an interdisciplinary approach to understanding and evaluating the opportunities for enhancing the human condition and the human organism opened up by the advancement of technology. Attention is given to
both present technologies, like genetic engineering and information technology, and anticipated future ones, such as molecular nanotechnology and artificial intelligence.

The enhancement options being discussed include radical extension of human health-span, eradication of disease, elimination of unnecessary suffering, and augmentation of human intellectual, physical, and emotional capacities. …

Transhumanists view human nature as a work-in-progress, a half-baked beginning that we can learn to remold in desirable ways. Current humanity need not be the endpoint of evolution. Transhumanists hope that by responsible use of science, technology, and other rational means we shall eventually manage to become post-human, beings with vastly greater capacities than present human beings have.“

Enhancement of Bodily Functions and Enhancement of the Brain

The WTA website also states that it is very difficult to distinguish between those genetic enhancements that only concern the body and those that only concern the brain. For example, longevity would seem to be an enhancement that affects the body only, but under „Life Span“ the WTA website claims:

„… Human character development is also cut short by aging and death. Imagine what might have become of a Beethoven or a Goethe if they had still been with us today. Maybe they would have developed into rigid old grumps interested exclusively in conversing about the achievements of their youth. But maybe, if they had continued to enjoy health and youthful vitality, they would have continued to grow as men and artists, to reach levels of maturity that we can barely imagine. We certainly cannot rule that out based on what we know today. …“

Likewise, under the headline „Bodily functionality“ the WTA website writes:

„… The current human sensory modalities are not the only possible ones, and they are certainly not as highly developed as they could be. Some animals have sonar, magnetic orientation, or sensors for electricity and vibration; many have a much keener sense of smell, sharper eyesight, etc. The range of possible sensory modalities is not limited to those we find in the animal kingdom. There is no fundamental block to adding say a capacity to see infrared radiation or to perceive radio signals and perhaps to add some kind of telepathic sense by augmenting our brains with suitably interfaced radio transmitters.“
While it is already a technological challenge that cannot be met today to lift an underperforming individual either up to the average statistical norm or to the best naturally possible level, any enhancement of body functions beyond that would certainly require the creation of a suitable control function in the brain that is completely new and inconceivable today. An eye that is capable of seeing x-ray or infrared must be connected to a vision-processing and an image-producing unit in the brain that is able to process the incoming sensory information, otherwise these enhanced senses are useless. The same is true for processing ultrasound hearing, for controlling wings or for body functions that would allow living under water, etc. Animals’ brains could serve as models on how this has to work but still, the additional functions would have to be integrated into the current human’s brain.

In other words, there is always an intense interrelation between body and brain that can be very direct – additional senses require additional computational power in the brain – or that can be more subtle and indirect. For example, almost any body enhancement will have some effect on the brain, whether it is better looks leading to better feelings, longer lives leading to a different character development and attitude towards life, more muscular strength and more physical endurance potentially leading to different lifestyles and social behavior, etc.

Thus the brain is so closely interrelated with the rest of the body that for a genetic engineer it would be impossible to just enhance one while ignoring the other.

**Goals of GEHB**

When transhumanist authors write about GEHB issues, they rarely refer to the actual changes that would have to be made to physical brain structures. Typically, when talking about GEHB (even though this specific term might not be used), the publications analyzed for this book refer to the goals of enhancement in a very broad and general way. Usually they make a rough distinction between the enhancement of cognitive powers on the one hand and emotional traits on the other. Here again, the website of the World Transhumanist Organization delivers the most understandable and concrete description of what this could mean.
Enhanced Cognitive Power

"Intellectual capacity. We have all had moments when we wished we were a little smarter. The three-pound, cheese-like thinking machine that we lug around in our skulls can do some neat tricks, but it also has significant shortcomings. Some of these – such as forgetting to buy milk or failing to attain native fluency in languages you learn as an adult – are obvious and require no elaboration. These shortcomings are inconveniences but hardly fundamental barriers to human development.

Yet there is a more profound sense in which the constraints of our intellectual apparatus limit our modes of our mentation. I (Author’s note: i.e., Nick Bostrom) mentioned the chimpanzee analogy earlier: just as is the case for the great apes, our own cognitive makeup may foreclose whole strata of understanding and mental activity. The point here is not about any logical or metaphysical impossibility: we need not suppose that posthumans would not be turning computable or that they would have concepts that could not be expressed by any finite sentences in our language, or anything of that sort. The impossibility that I am referring to is more like the impossibility for us current humans to visualize a 200-dimensional hypersphere or to read, with perfect recollection and understanding, every book in the Library of Congress. These things are impossible for us because, simply put, we lack the brainpower. In the same way, we may lack the ability to intuitively understand what being a posthuman would be like or to grow the playing field of posthuman concerns. ... Further, our human brains may cap our ability to discover philosophical and scientific truths. It is possible that failure of philosophical research to arrive at solid, generally accepted answers to many of the traditional big philosophical questions could be due to the fact that we are not smart enough to be successful in this kind of enquiry. Our cognitive limitations may be confining us in a Platonic cave, where the best we can do is theorize about "shadows", that is, representations that are sufficiently oversimplified and dumbed-down to fit inside a human brain. ...

(Source: the WTA website on March 21st, 2006: http://www.transhumanism.org/index.php/WTA/more/transhumanist-values/)

The enhancement targets for cognitive powers portrayed in the literature are separated into two areas:
**Intelligence,** defined as the speed of learning and capability of taking into account a large number of factors very speedily.

**Memory,** defined as the capability to store, hold as long as possible and, when needed, speedily retrieve any kind of information like words, facts, figures, images, emotions, etc.

I have found no serious scientific investigation or any published speculation that considers how this might become feasible or what exactly this means. For example, does memory extension mean that the enhanced human being is forced to keep everything in his or her memory? Couldn't that bring along tremendous suffering as well, for example when a torture victim cannot forget what has happened? Wouldn't that mean, in turn, that there would have to be an artificial and enhanced deliberate memory-delete function?

Also, with intelligence being a summary term for a whole array of different brain capabilities (creative and artistic intelligence, spatial imagination, mathematical intelligence, social intelligence, emotional intelligence, intuition, etc.) it would actually be helpful to find more details on what kind of priorities the pro-GEHB authors would propose, but nothing of this kind can be found in the literature researched for this book.

**Enhanced Emotions and Better Self-Control**

"**Mood, energy, and self-control.** Despite our best efforts, we often fail to feel as happy as we would like. Our chronic levels of subjective well-being seem to be largely genetically determined. Life-events have little long-term impact; the crests and troughs of fortune push us up and bring us down, but there is little long-term effect on self-reported well-being. Lasting joy remains elusive except for those of us who are lucky enough to have been born with a temperament that plays in a major key.

*In addition to being at the mercy of a genetically determined set point for our levels of well-being, we are limited in regard to energy, willpower, and ability to shape our own character in accordance with our ideals. Even such “simple” goals as losing weight or quitting smoking prove unattainable to many.*

Some subset of these kinds of problems might be necessary rather than contingent upon our current nature. For example, we cannot both have the ability easily to break any habit and the ability to form stable, hard-to-break habits. (In this regard, the best one we can hope for may be the ability to easily get rid of habits we did not deliberately choose for ourselves in the first place, and perhaps a more versatile habit-formation system that would
let us choose with more precision when to acquire a habit and how much effort it should cost to break it.)”

(Source: the WTA website, March 21st. 2006: http://www.transhumanism.org/index.php/WTA/more/transhumanist-values/)

In respect to better emotions, the literature provides basically two sets of enhancement visions:

- The vision that enhanced humans have a *permanently improved emotional life* and feel happier than the average human being does now, which is more or less what the above quote from the WTA website suggests. We have already seen in the chapter about the technological aspects that this would require a modification in the genes that determine the production and processing of the „neurotransmitter cocktail“ such that the same outside events are processed and evaluated by the brain in a more positive way.

- The vision of enhanced humans being able to *better control their emotions or – to be more precise – their desires*. The range of envisaged application includes above all

  - **Appetite control** (i.e., to avoid obesity without having to painfully control eating habits with willpower);
  - **Sex-control** (as mentioned above this could either mean suppressive control of sexual desires or almost the opposite i.e., more sexual capabilities –built-in Viagra-on-demand so to speak);
  - **Pain control** (the ultimate and basic means to avoid suffering);
  - **Anger control** (to avoid social conflicts and harmful stress);
  - **Aggression control** (to improve harmony in personal life, but also very much in a political sense)
  - **Ego-control** (I have come up with this term as a headline for a whole array of enhancement visions related to a more cooperative behavior based on a decreased urge for accumulating and protecting property of all kinds, to an overly developed need for respect and self-esteem. It should be noted that there is also the exact opposite vision that sees a boost of the self-esteem as more desirable, just like Ritalin does it to kids that are too shy);
Fear control (so that one can enjoy a more authoritative presentation of oneself on stage and in public; for astronauts, soldiers, and other people when they have to perform risky tasks).

In case of the control-of-emotion visions, the enhancement goal would not be to „install” a permanent feature but, rather the genes that are responsible for the formation of the rational control mechanisms would have to be modified. This would mean, for example, that those physical structures in the brain where appetite promoters or inhibitors, adrenalin, testosterone, and all the other neurotransmitters that control our behavior would have to be genetically modified such that the free will can control the production or the avoidance of any of these neurotransmitters in any given situation. „Enhanced emotion control,” in this sense, implies actually the very ambitious goal of equipping an individual with the capabilities that are necessary to deliberately influence the production or disappearance of adrenalin, testosterone, etc., in the brain on command. Total control over these features would eventually mean total free will and total freedom of uncontrollable, random feelings. If and how this could be made feasible in a microbiological sense by genetic engineering is completely unclear at this stage.

For transhumanists self-control and self-determination is an important goal and leads to the demand of not just „improving” emotions, but of controlling them in the utmost way. For example, James Hughes applauds Patient Controlled Analgesia (PCA) machines as an enormous technological and human progress in the medical field and predicts further enhancement technologies being developed in spite of what he perceives to be the „... religious belief that life is supposed to be nasty, brutish and short...”: „PCA machines allow patients to determine when and whether to inject themselves with a predetermined dosage of narcotic. ... Future nano-neuro interfaces will allow even more fine-tuned control of pain and pleasure.” (Hughes, 2004, pp. 44-45).

In its most radical form this vision wishes and foresees humans that are able to deliberately feel calm and satisfied in one moment then stir themselves up to be curious and risk-seeking the next, to be alert and funny during the weekend and completely focused and absorbed by some work project during work hours, etc. For example, according to James Hughes (Hughes, 2004, page 98) the World Transhumanist Organization defines „posthumanity“ as follows: „... to reach intellectual heights as far above any current human genius as humans are above other primates; ... to exercise control over their own desires, moods, and mental states; to be able to avoid feeling tired, hateful, or irritated about petty things; to have an increased capacity for pleasure, love, artistic
appreciation, or serenity; to experience novel states of consciousness that current human brains cannot express.”

Leaving for a moment the paradigm that the WTA management represents the official opinion of all transhumanists, it is important to note that there are various visions on other human traits that the transhumanist community talks about and different transhumanists propose quite contradictory goals. They relate, for example to following traits:

- **Gender differences**
  
The biological differences between male and female humans are hardly doubted today by any scientist. It is common knowledge that these differences have been the cause of a lot of conflict and suffering. For example, in her bestselling book „You Just Don’t Understand – Women and Men in Conversation“ (2001) linguist Deborah Tannen shows with an abundance of examples that humans have to struggle almost every day with misunderstandings between men and women because male and female communication patterns are (I don't think she ever right out claims that these differences are truly genetic) different to a surprisingly high degree. And yet, there might be a lot of romantic transhumanists who might find that it is exactly these gender differences that bring a lot of bliss and happiness to human life. Not surprisingly, it is therefore unclear whether „enhancement“ really means more of less of these differences.

- **Productivity and creativity in an economic sense.**
  
Many parents would probably feel they are pursuing the best interest of their children by enhancing their traits that are linked to economic success, like dedication to achievement, self-discipline, creativity, etc. For many this is too materialistic and real human progress depends on a contemplative feature as well.

- **Increasing curiosity and risk-taking or increasing risk aversion.**
  
Depending on the values of the parents they would either want to make their kids more daredevil and outgoing or more obedient and safety-driven. It is easy to see how general attitudes and values about the right life and the right society will enter into the genetic enhancement decisions and the debate about them by just looking at those few examples.
6.3.2. Final Ends of Transhumanism

Most transhumanist authors focus on the well-being of the individual human being or at least what they perceive to be the obvious method to increasing a future child’s well-being. For example, James Hughes claims that “… People with sharper minds are more successful in life, make more money, are healthier and live longer“ and he does not have any doubts that this allegedly linear correlation should also determine future action once natural limits to what education and stimulation can achieve are reached: “… for affluent and middle-class people in the developed countries, we may be reaching limits of how much intelligence we can achieve without genetic or pharmaceutical help.“ (Hughes, 2004, page 35). Also, the prevention of dementia for senior citizens is a concern of transhumanists for whom longer lives are another target to strive for by means of genetic enhancement.

But transhumanists usually also claim that there is a potential for improving social behavior and thereby human society as a whole by introducing and applying GEHB on a large scale. Transhumanists see themselves as an extension of traditional humanists, just with different means. They claim that implanting humanist values through education or Kantian rationality has not proven to be very effective during the past history of humankind and, thus, it is completely legitimate and even necessary to attack the biological root causes of many of the ills of humanity from a humanist point of view by applying GEHB.

Some authors even claim that extensive GEHB will become an indispensable necessity if we want to survive as a species in an ever-more complicated world that can no longer be understood by today’s average intelligent human being. GEHB, they claim, is good and maybe even necessary for the future development of democracy. James Hughes writes:

„The more intelligent the citizens, the more capable they will be at assessing their own interests, understanding the political process and effectively organizing.“

Hughes, 2004, page 42)

„ … Human enhancement technologies promise to expand our capacity for citizenship. … Once we expand our capacities for knowledge, attention, deliberation and communication, even a small proportion of our energies may be enough to read journals, monitor C-SPAN, participate in online debates and vote on the UN referenda, while the rest of our brain gets on with more important things in our lives. …
We will have unimaginable control over currently unconscious reactions to the world, our ingrained deference to hierarchy, our addictions and self-destructive behaviors and the ways we are manipulated by advertising, charismatic authority and social approval.

… to embrace transhuman enhancement … may be the only way to keep liberal and social democracies competitive with authoritarian regimes.“

(Hughes, 2004, pages 199/200) (maybe that’s enough James Hughes quotes)

Transhumanists all have in common a belief in the future feasibility of technologies that are far from possible and safe today. Transhumanism accepts the need for safety and regulation, but regards these issues as operational side issues that should not block our view of long term strategic goals. And above all, they should not restrain the freedom to try it out for those who wish to do so, unless there is a really good reason. Says James Hughes (2004, page 139/140) about the concern that there might be long term effects, e.g., of increasing the probability of getting cancer because of genetic enhancement of a child’s intelligence: „That kind of risk is not a real risk or a real harm, and not a legitimate ground for interfering in the very real reproductive freedoms and obligations of parents. Any appeals to the dangers of germ line modification beyond adolescence, not to mention hypothetical anxieties about effects on the next generation, are absurd since future generations will be upgrading whatever genome they get from their parents.“

The transhumanist declaration (formulated in 2002 and revised in 2004) gives a good impression of the deeper philosophical motives of transhumanist thinking:

„The Transhumanist Declaration

(1) Humanity will be radically changed by technology in the future. We foresee the feasibility of redesigning the human condition, including such parameters as the inevitability of aging, limitations on human and artificial intellects, un-chosen psychology, suffering, and our confinement to the planet Earth.

(2) Systematic research should be put into understanding these coming developments and their long-term consequences.

(3) Transhumanists think that by being generally open and embracing of new technology we have a better chance of turning it to our advantage than if we try to ban or prohibit it.
(4) Transhumanists advocate the moral right for those who so wish to use technology to extend their mental and physical (including reproductive) capacities and to improve their control over their own lives. We seek personal growth beyond our current biological limitations.

(5) In planning for the future, it is mandatory to take into account the prospect of dramatic progress in technological capabilities. It would be tragic if the potential benefits failed to materialize because of technophobia and unnecessary prohibitions. On the other hand, it would also be tragic if intelligent life went extinct because of some disaster or war involving advanced technologies.

(6) We need to create forums where people can rationally debate what needs to be done and a social order where responsible decisions can be implemented.

(7) Transhumanism advocates the well-being of all sentience (whether in artificial intellects, humans, posthumans, or non human animals) and encompasses many principles of modern humanism. Transhumanism does not support any particular party, politician or political platform.”


The technology-enthusiasm of transhumanists makes them naturally inclined to believe in technological solutions rather than in the self-restrictive traditional wisdom of most religions and of many traditional philosophical concepts. James Hughes, for example, ridicules the concerns of the „President’s Council on Bioethics“ concerning genetic enhancement by quoting author Brian Alexander saying:

„… Fukuyama and Kass are the Vince Lombardis of the biotech opposition (what is he referring to here by referring to Vince Lombardi, insisting that suffering was a part of nature. Hurt? Tape it up. Happy pills like Prozac are sucking the manliness out of us. So what if you are depressed? That’s life. Kid can’t pay attention? Well some kids are like that. Stop being sissies. Take your imperfections like the true Americans you are and die on time.“

(Hughes, 2004, introduction page xiv)

It may be also typical for a transhumanist like James Hughes to believe that our future lies in outer space without bothering too much about the technological feasibility. Nor does he consider the alternative that organizing our lives better here on Earth might cleverer since it is much more easily feasible if humanity invest enough efforts in it, if we are willing to restrict ourselves, and if we are willing to change some of our habits. This last thought is one
of the most important lines of thinking of technology negativism which shall be investigated in more detail in the next chapter.

6.4. Summary and Conclusions

Technology has brought many changes to human life and it is one of the most dominant features of Homo sapiens that we are technological creatures. The possibilities of our neo-cortex to process and store vast amounts of information have enabled us to analyze, imitate and finally improve what we see in our surroundings.

Equipped with these capabilities it took us only a few thousand years – a miniscule part of the whole 3.5 billion year long history of life - to develop from tool makers to builders of skyscrapers and airplanes. Airplanes are a good example of how far we have come: No bird has the size and the speed of the flying machines that humans can build, no living creature created by natural evolution would have the slightest chance to travel to the moon as we can with modern space technology. Most of the development has happened within only the last 200 years.

Given these historic facts it is easy to see why some people think that re-shaping the fundamental biological design of Homo sapiens by genetic engineering is only a matter of time, and not very much time at that. Most of those who develop the vision of our genetic engineering future do not see a problem with this. They argue that also in the past the advancement of science and technology had sometimes been quicker than people's willingness to get used to new circumstances. Technology resistance does have a reputation of being old fashioned and irrationally opposed to everything that is new.

This stigma of technology critics being ridiculous in their concerns might be one of the main reasons why it is so difficult to pin down the – secular – arguments that counter the transhumanist world view. While the „transhumanists” are vigorously battled by religious advocacy groups (thereby providing free public relations that this small minority of technology enthusiasts could otherwise never create by themselves) the secular counter position to transhumanism is more difficult to formulate. What is so bad about parents wanting to increase the biological basis for the intelligence, memory,
happiness, etc. of their future children? Why should it be prohibited to improve by genetic engineering what can also be improved by surgery or by drugs? Isn’t the claim that human nature should not be changed somewhat ridiculous considering the difficulties of defining what exactly this human nature is? And besides: What is „natural” about humans and their living conditions in the 21st century anyway?

And yet, there are numerous arguments against the transhumanist position that are at the same time secular and worthwhile considering. As a matter of fact, some of them might be seen as so strong from an ethical point of view that they could lead to demanding a ban of GEHB in the same way the arguments derived from religion and from the human dignity theories do.

The following chapter is an attempt to bring some order to a large variety of yet disorderly arguments against GEHB.
7. TECHNOLOGY SKEPTICISM

7.1. A Brief Historical Explanation of the Term „Technology Skepticism“ as Used in this Chapter

Technology skeptics have probably always existed as long as „technology“ (in its sense of highly sophisticated tools and methods) has existed. Most affected by the erosion of spiritual power that accompanied the advancement of scientific knowledge has always been the religious clergy who base their power on beliefs, while science has always been based on the existence of clear evidence. But others, political leaders for example, –have also had to fear the democratic effects of the question: „can you present some evidence for what you claim and can you show that it works?“ Technological knowledge has always had to do with questions of power as well. This development is not as new as we sometimes think; it really has been going on for many centuries, maybe even for millennia.

The rivalry between spiritual-idealistic ideas and a materialistic-technological way of life is still omnipresent today. It seems that at this point in human history the latter is definitely the winner in the fight for the hearts and minds of people. It remains uncertain whether this will always stay this way, but today most educated people are so impressed by the visionary capabilities of historic figures like Leonardo da Vinci, Jules Verne, Charles Darwin and Sigmund Freud that most people look down upon those who rejected their ideas when they where first published. As a consequence, technology skepticism is today quite often regarded as a mixture of ignorance and arrogance. „Technology skeptics have a tendency to be generally adverse to any changes, but will accept them eventually when the advantages simply can no longer be ignored.“ This is the basic thesis of technology positivists. New developments always take time to be accepted when they first came out whether this is rock ’n’ roll music, vitamin pills or computer technology, but in the end the innovators have always won. Today we have come to a stage, where, due to these historic experiences of the
past, technology skeptics always have to fear that future history will label them as over-concerned and narrow-minded simpletons ridiculous in their extreme pessimism, worries and old-fashioned concerns.

The emergence of new technologies also frequently threatens existing economic structures. There are always losers of technological developments who do not embrace new technologies with enthusiasm for „selfish” reasons, one further reason for technology optimists to frown upon and highly doubt the technology skeptics’ worries as being really unbiased. Of course the owners of carriages resisted the growing importance of cars; the owners of ocean passenger's liners naturally were not fond of the growth in transatlantic flights; of course graphic designers do not like the fact that easy-to-use desk top publishing software is sold to owners of personal computers in large quantities, etc. Technology skeptics must prove that they do not belong to a group of people who have to suffer personal disadvantages from a new technology in order to stay credible in their criticism.

As a consequence, it is easy to, for example, discredit critics of genetic enhancement by comparing them to the machine breakers of the early 19th century by calling them „bioLuddites” as James Hughes does in his book Citizen Cyborg. The historic Luddites were weavers who saw their livelihood threatened by the development of weaving machines and formed a guerilla movement that attacked factories and destroyed the weaving machines under the leadership of Ned Ludd in Great Britain in the years after 1812. As we all know, the movement failed to prevent technological change. For technology-positivist libertarians, it has become a model of narrow-minded, egotistical technology-skepticism.

In the second half of the 20th century, however, the community of technology skeptics has not only increased in numbers considerably, but has begun to encompass a completely different kind of people than the proletarian workers of early capitalist times. It may have started with Franz Oppenheimer, who bitterly regretted his scientific work that eventually led to the construction of the first nuclear bomb. Soon after World War II, nuclear weapons technology moved into the center of grave doubts amongst the intellectual elite of the Western world when the 1963 Cuban missile crisis showed that Oppenheimer’s thoughts and regrets were not far fetched at all. Today, the prospect of more and more of the approximately 200 national governments on earth owning nuclear weapons gives the intellectual elite a shiver. The prospects of a proliferation of chemical and biological weapons ending up in the hands of irrational forces like terrorists raises doubts in the
minds of many people regarding the desirability of technological changes of all kinds.

These doubts are not restricted to military technology. There are other topics which have given rise to doubts about the risk-benefit rations of modern technology among the intellectually sensitive world population, probably a few hundred million people today. These include the climate change with the ensuing floods, storms or a possible new ice age in a not so far away future, the depletion of natural resources, the increasing scarcity of drinking water, the destruction of biodiversity – everywhere we look our modern civilization does considerable harm to our natural world by using technology.

In addition, more and more news about negative consequences of technology unforeseen by the experts involved in their development are transported by the media to television and the Internet, reaching hundreds of millions of households every day. With each additional piece of news, more and more of the intellectual elites of the late 20th century developed the feeling that not more but less technology might be the solution to the fundamental problems of mankind. Downsizing and „back to the roots“ became a fashionable attitude. The hippie movement in the 1960s and 1970s was an awkward attempt to transform this new philosophical attitude into a practical life style and other such attempts like the upswing of exotic spiritual packages from India and the Far East could be observed during the last three decades. But none of these radical holistic attempts was suitable for creating a new, „high-tech-free“ society that still stayed attractive enough for the majority of its members to live in. All of these attempts to get away from the „technology-trap“ remained action-oriented moves by a limited number of individuals whose primary goal was to change their own personal lives and who had only vague ideas on whether and how to change human society as a whole.

Maybe due to resignation or maybe out of pragmatism, the mainstream attitude of technology skepticism today is more restricted to concrete issues and policy related topics, rather than focused on attempts to bring about overall change of the human living condition. This pragmatic attitude, however, has made it to mainstream politics in various cases, especially in Western Europe. From the obligation to use unleaded fuel to the international attempts to reduce the production of greenhouse gases to the resistance to using genetics in agriculture – all of these policies are an outflow of today’s mainstream technology skepticism. The acceptance of the green parties in
the political arena and their participation in the German government from 1998 to 2005 are clearly indicators of a shift of attitude especially amongst the more intellectual segments of Western societies towards a more cautious relationship with technology.

A main part of the de-mystification of high tech came with the recognition of the imperfection of any kind of technology. We had to learn that technologies frequently fail to deliver what they promise. Nobody is surprised any more when a car manufacturer announces a recall of cars of a certain model because a dangerous construction flaw has been discovered; we have gotten used to the fact that technology comes into existence more or less by tinkering around in a systematic way, by developing something through a series of trial-and-error-cycles. And we all know that technology is produced to make money and only strict liability laws prevent manufacturers from bringing technologies to the market that might work at first sight, but turn out to be extremely risky and cause an unacceptable degree of damage. Very few Westerners today would claim that it is possible to produce completely risk-free technology that will always function as planned.

The same holds true for biomedical technologies. One of the key experiences was probably the scandal with Thalidomide, a sleeping pill that came out in 1957 and was taken off the market in 1961 after it had damaged 15,000 fetuses of pregnant woman who had taken it. The explosion of the nuclear power plant in Chernobyl in 1986 and the horrific damage done by this technology failure was for many technology skeptics a confirmation of what they had always said before about nuclear technology: it is too „big“ and complex to be handled by the limited minds of human beings and should, therefore, be abolished totally. It is fair to assume that the Chernobyl accident greatly contributed to this kind of thinking.

The anti-genetics movement attracts the same kind of activist that already formed the anti-nuclear energy movement. Greenpeace, for example, has formed a new field of activity in fighting against any kind of green genetics technology. It is also based on the same philosophical beliefs: that human beings are generally and for very fundamental reasons not able to eliminate the risks of applying technology and that we will always have to live with imperfect technology. This means, in turn, that certain technologies should be banned from being developed and used due to the magnitude of the risks that they bear in themselves. At the very least, they must be strictly regulated and controlled. So far the main target of the anti-genetics movement is green genetics, in particular in Western Europe. On April 17th, 2005
The Frankfurter Allgemeine Zeitung (page 69) published a full page article about the attempts to reintroduce more sophisticated taste into modern day strawberries. For two decades the focus of the Mendelian-type breeders and then more and more of the geneticists of the agro-business was to make strawberries resistant to pests and make them firmer for ease of transport. However, consumers have now started to realize that the original strong taste and smell of natural strawberries has been lost and want it back. According to the article in the FAZ, this was not an easy task for the highly paid laboratory workers of modern agriculture. So far all attempts to create strawberry-aroma that could keep up with the „real thing“ of nature in sophistication and quality failed. This is certainly true for the impoverished artificial food flavor that is used in most strawberry ice cream today, but there is no choice since the demand far outstrips the supply, even including what is harvested in the quick-fix greenhouses of high tech agribusiness. In an experimental lab close to Dresden, Germany, hundreds of kinds of original strawberries are maintained as live carriers of the around 300 aromatic ingredients contained in natural strawberries. Without any of these aromatic ingredients, strawberries would taste like a raw potato, which is actually true for many of the kinds in today’s supermarkets. „How dare they think of GEHB?“ - a typical technology skeptic might say when reading this article in the FAZ, – „when whole research divisions of large agricultural companies are not even able to produce tasty strawberries? They are obviously unable to imitate the sophisticated combination of flavor elements that can be found in the natural strawberries – how would they ever be able to produce the right mix of personality traits with GEHB?“ Due to pressure from advocacy groups the European Union has entered into a major trade conflict with the United States over genetically modified food crops with the EU wanting restrictions and regulations that the free-market advocates of agribusiness in the USA find unacceptable.

The preference of regulations and restrictions by technology skeptics is quite obviously in sharp contrast to what the technology-enthusiastic libertarians think should be done. This conflict will take us inevitably to the arena of a political discussion, which is where the crucial decisions eventually have to be made.

These lengthy explanations about general technology skepticism make it easy now to explain the specific technology skepticism directed at the application of any genetic technologies, in particular the genetic engineering applied to human beings, in particular those that would manipulate the hu-
man brain. This is how the wisdom goes: „If human beings and their top
talents are not even able to produce perfectly functioning cars, safe nuclear
power plants and harmless sleeping pills for pregnant women – how can we
even think of touching the most valuable, intimate and far reaching issue of
manipulating the genetic makeup of the human brain?!“

7.2. Overview: Concerns of Technology Skeptics in Relation to GEHB

This subchapter will try to summarize the most important of the wide range
of arguments against GEHB that arise from the technology skepticism as
portrayed above. This very brief historic synopsis will try to make it very
clear that the attitudes and philosophical thoughts of technology skeptics
might be influenced by religious elements or the ancient thought of the hu-
bris that has found its way into the general culture, but the foundation and
the explicit argumentation of modern technology skepticism is very secular.
It is, in this sense, maybe much more universal and definitely more prag-
matic and concrete than the human dignity and human rights approach can
ever be. It is not out to apply a pre-given principle on new situations that
would come about by the application of GEHB technologies, but it emerges
out of very practical observations of concrete realities and of their potential
implications.

The rest of this chapter will try to bring some order into the wide range of
those secular and pragmatic arguments against GEHB by packaging them
together under five headlines. It has to be emphasized that „packaging“ al-
ways means that some elements have to be consolidated to create a clear
overview, but this is a worthwhile price to pay for keeping sight of the big
picture.

First, there will be a discussion of the dangers of political abuse that were al-
ready described in a visionary way in Huxley’s Brave New World and be-
came practiced politics in various eugenic programs, whereby that of the
Nazis is by far the most notorious one.

Second, there is a subchapter about the dangers of undesired side effects of
highly complex technologies like GEHB. This was already discussed to
some extent in a previous chapter on GEHB from a scientific-technological point of view. The text below will supplement and complete the argument.

There will be two subchapters about the potential negative effects of GEHB on society that technology skeptics fear:

The danger of a growing inequality – so a distributive-justice-concern that assumes that the wealthy will also have more and earlier access to genetic enhancement;

The danger of „structural pressure“ – meaning that the enhancement of certain individuals will always define binding obligations for the rest of society, in particular when there is a great number of enhanced individuals setting the standards. This supposedly affects the overall well-being, identity and personality of all human individuals in a negative way.

Last but not least, this leads inevitably to the key question of technology skepticism in general: Are we stepping over the threshold of what should be or what is the „human limit“?

7.3. Political Distortions, Misunderstandings and Abuses: Eugenics and the Power of Belief as a Case Study

7.3.1. The History of Eugenics

Fukuyama (2002, page 85) concisely summarizes the origins and the development of the eugenics movement thus:

„Eugenics was a term coined by Darwin’s cousin Francis Galton. In the late nineteenth and early twentieth centuries, state-sponsored eugenics programs attracted surprisingly broad support, not just from right-wing racists and social Darwinists, but from such progressives as the Fabian socialists Beatrice and Sidney Webb and George Bernard Shaw, the communists J.B.S. Haldane and J.D. Bernal and the feminist and birth-control proponent Margaret Sanger. The United States and other Western countries passed eugenics laws permitting the state to involuntarily sterilize people deemed ‘imbeciles,’ while encouraging people with desirable characteristics to have as many children as possible. …}
The eugenics movement in the United States was effectively terminated with revelations about the Nazis’ eugenics policies, which involved the extermination of entire categories of people and medical experimentation on people regarded as genetically inferior. Since then, continental Europe has been effectively inoculated against any revival of eugenics and has, in fact, become inhospitable terrain for many forms of genetic research. The reaction against eugenics has not been universal: in progressive, social democratic Scandinavia, eugenics laws remained in effect until the 1960s. Despite the fact that the Japanese conducted medical “experiments” on unwilling subjects during the Pacific war… there has been a much smaller backlash against eugenics there and in most other Asian societies. China has pursued eugenics actively … through a crude eugenic law, passed in 1995 and reminiscent of Western ones from the early twentieth century, that seeks to limit the right of low IQ people to reproduce."

The idea of genetic enhancement had been born long before DNA was discovered in 1953. Even though it was Darwin’s work that fostered the belief in the genetic inheritability of traits, it was Mendel’s work that was now being transferred into „technology.“ It will come as a shock for many that the pioneering in the field of eugenics happened in the United States in the early 20th century. James Watson, one of the two discoverers of the DNA, describes the early beginnings in his 2003 book „DNA“ (pp. 22-24):

„The lead in this endeavor was taken on Long Island by one of my predecessors as director of the Cold Spring Harbor Laboratory. His name was Charles Davenport. Its mission was to collect basic information – pedigree – on the genetics of traits ranging from epilepsy to criminality. It became the nerve center of the American eugenics movement. … However, there is no doubt that the research program initiated by Davenport was deeply flawed from the outset and had horrendous, albeit unintended consequences. … Davenport applied Mendelian analysis to pedigrees he constructed of human characteristics. Initially, he confined his attentions to a number of simple traits – like albinism and Huntington disease – whose mode of heritance he identified correctly. After these early successes he plunged into a study of the genetics of human behavior. Everything was fair game, all he needed was a pedigree and some information about the family history … and he would derive conclusions about the underlying genetics. … He shows pedigrees of families with musical and literary abilities, and a family with mechanical and inventive ability, particularly with respect to boat-building (Apparently Davenport thought he was tracking the transmission of the boat building gene).“
Another important contribution to the boom of the eugenics movement from the "scientific side" was made by the general acceptance of intelligence tests in the 1910s. By today's standards those tests are incredibly and ridiculously unscientific as the following quote from Watson, 2003, page 22 shows by means of a few questions that the U.S. Army used for checking the intelligence of their recruits prior to World War I:

"Pick one of four:

1.) The Wyandotte is a kind of
a) horse  b) fowl  c) cattle  d) granite

2.) The ampere is used in measuring
a) wind power  b) electricity  c) water power  d) rain fall

3.) The number of a Zulu's legs is
a) two  b) four  c) six  d) eight

Some half of the nation's army recruits flunked the test and were deemed 'feebleminded.' These results galvanized the eugenics movement in the United States; it seemed to concerned Americans that the gene pool really was becoming more and more awash in low-intelligence genes."

Even though today we realize immediately that a test of this kind measures educational knowledge rather than the intelligence of an individual, this was not clear at all to the academic elite of the United States only one hundred years ago and had very wide ranging and shocking political consequences. For example, Watson quotes the example of prison director Harry Sharp who ordered the sterilization of a man who was diagnosed by the medical doctors of the prison to by feebleminded due to "compulsive masturbation." He was so proud of his idea of not only "curing" the man with this measure but also of preventing him to pass on his masturbation gene to any offspring that he went into politics and lobbied in favor of "negative eugenics", i.e., forced sterilization, to protect the gene pool. "Sharp was an effective lobbyist, and in 1907 Indiana passed the first compulsive sterilization law, authorizing the sterilization of confirmed 'criminals, idiots, rapists, and imbeciles.' Indiana's was the first of many: eventually thirty American states had enacted similar statutes, and in 1941 some sixty thousand individuals in the United States had duly been sterilized, half of them in California alone. The laws, which effectively resulted in state governments deciding who could and could not have children, were challenged in court, but in 1927 the Supreme Court upheld the Virginia statute in the landmark case of Carrie Buck. Wendell Homes wrote the decision: 'It is better
for all the world, instead of waiting to execute degenerate offspring for crime, or to let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind ... Three generations of imbeciles is enough ...” (Watson, 2003, page 27).

All this happened in a general atmosphere of belief in genetics that unified radical racists as well as leftist activists. Examples of the latter kind are Margaret Sanger, the founder of Planned Parenthood, who proclaimed in 1919: „More children from the fit, less from the unfit – that is the chief issue of birth control.“ (Watson, 2003, page 26) and John Burdon Sanderson Haldane whose landmark essay „Daedalus or Science and the Future“ (1923) made Aldous Huxley write his novel Brave New World a few years later. In 1932 Haldane was elected to the British Royal Society and the following year became Professor of Genetics at University College in London. Haldane was an active anti-fascist, and worked to defend the Spanish Republic against the rise of fascism. While at Oxford Haldane joined the eugenics society and became a member of the Communist Party in 1937.

But it was the Nazis who showed the world to what consequences eugenics can lead if taken to the extreme. Hitler had written about eugenics already in his book Mein Kampf in the 1920s and basically just repeated what was a popular belief at that time anyway: „Those who are physically and mentally unhealthy and unworthy must not perpetuate their suffering in the body of their children.“ (Quote from Watson, 2003, page 31). When the Nazis came to power in 1933 they immediately passed a law to prevent a wide range of what they perceived to be genetic defects by forced sterilization (negative eugenics) and after the 1935 party convention in Nuremberg more eugenics legislation (called „law for the protection of German blood and honor“) was passed that prohibited marriage between Jews and Germans, and more social groups were classified as having „genetic disorders“ that had to be eliminated including homosexuals, gypsies, and the disabled. To speed up the process of racial cleansing and to close any reproductive loopholes that might still have existed, the mass murder programs were started in 1939 that caused the deportation and cruel killing of millions of human beings in the concentrations camps of the Nazi regime.

What was new and what made the decisive difference between the belief in eugenics by the Nazis and mainstream eugenics policies in the United States was the complete deviation from any scientific basis. For example, Nazi authorities defined arbitrary criteria for their selection policies like measuring the distance between the eyebrows, the length of the nose, etc. and claimed
these are criteria to be connected to personality traits without having the slightest empirical evidence for that claim. Politicians started to influence scientific results and not the other way round. It was not smart to contradict the Führer or any of his protégés and, thus, cowardly scientists started to produce desired results instead of researching in an unbiased way to find out true knowledge. Far reaching distortions of Darwin's ideas led the Nazis to develop their ideology that there are not only superior species, but that also within the species Homo sapiens their must be some grading classification. Of course, the Nazis believed that they themselves and the „Aryan race“ that they represented were at the top of this natural order. The Nazi ideology offered the beaten German soul (World War I had been lost, there was an economic depression and poverty in Germany, the new democratic political system functioned very poorly, etc.) a source of self esteem that was gratefully accepted without bothering too much about the soundness of the scientific basis that most people were not capable of understanding anyway.

After 1945 the world learned about the unbelievable atrocities committed in the name of theories that seem completely silly and ridiculous today, eugenics became one of the major taboo words of the second half of the 20th century. In the United States all eugenics programs were quickly terminated and it was erased from the collective memory that only a decade before there had been close ties between scientists of the U.S. government and the Nazi regime. For example, under president Calvin Coolidge, Harry Laughlin produced a study that was based on the categories that the German racial laws from 1933 provided and that Laughlin had translated into English and that caused immigration officers at some ports of the U.S. to reject Jewish immigrants from Germany seeking asylum in the U.S. in the late 1930s (See Watson, 2003, pp. 31-32). Watson also reports (page 32): „When in 1948 I first came to Cold Spring Harbor, former home of the by then defunct Eugenics Record Office, nobody would even mention the „E-word“: nobody was willing to talk about our science past even though past issues of the German ‘Journal of Racial Hygiene“ still lingered on the shelves of the library.“

The persistence of the idea of „breeding“ humans for higher quality in countries like the United States is shown in the shocking 2005 book Genius Factory by journalist David Plotz. This book reports the secret activities of an American multimillionaire who created a sperm bank by stockpiling the sperm cells and egg cells of successful individuals including a few Nobel
laureates in the 1980s and 1990s. This “genius factory” lead to the birth of over 200 alleged “super-children” before it closed down in 1999.

The basic idea of genetic enhancement was born in the form of eugenics. However, the baby turned into a monster, something which influences ethical thinking about genetic enhancement until today.

The idea of eugenics was discredited because the complex issue of genetic enhancement got into the hands of people who sought to confirm their prejudices with very shaky empirical evidence. At some point it was no longer a matter of scientific shaky evidence but of who had the political power to define the goals and the basic assumptions of those early eugenics programs. One could speculate now whether the enormous complexity of the matter – i.e., of the evolution of the human gene pool and of the effects this has - lends itself to abuse by policies of hatred, prejudice and disrespect of human dignity. It would be pure speculation as well to determine whether eugenics would still be a viable political idea had it not been abused by cruel and fact-ignoring politicians. „What would have happened,“ one may ask, „if the eugenics programs had actually worked, e.g., if the general IQ of the part of the population that applied eugenics for a generation or two actually had increased in an empirically measurable way?“ We can only speculate about this now because it did not happen this way, and the connection between state-sponsored genetic enhancement and immoral politics is embedded very deeply in the collective memory at least of the Western world. Due to our collective historic experience, eugenics has become synonymous with useless suffering.

This Western taboo is not shared by other cultures to the same extent, made clear by the following article written in full indignation by three American medical doctors in 1996: „Last year, China adopted a new law on maternal and infant health care. The law mandates that all persons have a premarital medical examination to detect serious genetic diseases, some infectious diseases, and ‘relevant’ mental disorders. If a detected disorder is deemed serious, the couple is not permitted to marry without committing to contraception or tubal ligation. Prenatal testing is enforced, and pregnancy is terminated if the fetus has a serious genetic or somatic abnormality.

A law ‘for prevention of progeny with hereditary defects’ is not a Chinese invention. It was proclaimed in Germany in 1933 and enforced the sterilization of persons with ‘congenital mental defects, schizophrenia, manic-depressive psychosis, heredi-
tary epilepsy ... and severe alcoholism.“ This law, endorsed by physicians, was a harbinger of one of the darkest episodes of modern history—the Holocaust.

In China, the ratio between male and female infants has increased to 1.1 because of prenatal sex selection (abortion of females) and (for lack of ultrasonography) the postnatal killing of females. Only one child per family is permitted, and male children are preferred for agricultural labor. China’s burgeoning population is unquestionably detrimental to its well-being, and a legitimate goal is fewer but healthier babies. Nonetheless, the compulsory exclusion of some parents and fetuses is unethical. No less disturbing is the impassive response by the world medical community. Although some have expressed contempt for China’s eugenics law, others justify a nonpartisan stance, claiming that „it is perilous to impose western morality on China.“ It is troubling that leading representatives of the medical community have not been at the forefront of protests against China’s gross violation of medical ethics and human rights. The danger lies not in the imposition of Western morality on China but in silence, the equivalent of consent." 

Copied from the following website on March 27, 2006; http://www.annals.org/cgi/content/full/125/5/425-a)

While for some the eugenics policies of China are ethically outrageous, for others they give reason to be alarmed because of the possibility of successful eugenics allowing the Chinese to overtake the rest of the world.. One of them is transhumanist James Hughes: „If the democracies hobble themselves with restrictions on human enhancement and technological innovation, we can be sure that the authoritarian regimes will not. Of course I am thinking of China. ... China has the only explicit eugenics law in the world. ... there is still a real possibility of conflict between the growing bloc of liberal and social democracies, laboring under self-imposed bans on human enhancement ... and militarily and economically robust authoritarian regimes like China using human enhancement, nanotechnology and Artificial Intelligence to full advantage.” (Hughes, 2004, pp. 200-201)

This last quote shows very clearly as well that the mental connection between traditional eugenics and modern germline engineering seems to be a very close and almost inevitable one. It seems that the Nazi-induced eugenics taboo is still so powerful that only countries as independent as China can afford to ignore it. Nevertheless, China has meanwhile abolished its eugenics laws; it is still recommended that parents undergo genetic screening and act accordingly if a grave genetic weakness is found, but it is no longer legally binding.
7.3.2. The Power of Belief or Humans as Pattern-Seeking Animals

The history of eugenics inevitably leads to the question: How can it be that so many people believed in completely erroneous empirical evidence and in shaky theories built to a large extent on no evidence at all? How can it be that such far reaching policies were introduced on such a weak, unsubstan-
tiated basis without evoking outcry from the majority of people and how can it be that it took a cruel dictatorship that brought war and suffering to the rest of the world to make people wake up? And above all: could it happen with modern versions of germline engineering, in particular with GEHB, once again? Could it be that this ugly part of human history might repeat itself? If not only regimes like Nazi Germany, China but also benevo-
lent dictatorships like Singapore and even fully functioning democracies like the United States, Sweden or Switzerland fell for the faulty theories – is democracy a useless tool to prevent monumental errors of this kind?

To get closer to possible answers to all these questions it may be helpful to turn to a few books that were published recently:


Secondly, the 2006 book of medical doctor Andrew Newberg and psycholo-
gist Mark Waldman with the title *Why we believe what we believe*.

All of these books offer an abundance of examples and evidence for the the-
thesis that human beings are almost compulsive pattern seekers. As such, they are very inclined to and dangerously open for all kinds of nonsensical theo-
ries if they promise to be a plausible explanation for the complex and often inexplicable reality that surrounds them, or when it promises to be a rem-
edy for a perceived problem. No matter whether it is Voodoo magic, witches that have to be burnt, demons that have to be exorcised, stomach ulcers that have to be treated by decreasing stress (not until 1982 was it dis-
covered that over 95% of all cases of stomach ulcers were caused not by emotional stress but by a specific type of bacteria) or intelligence that should be raised by eugenics or by germline intervention – most humans are in-
credibly gullible most of the time. Shermer shows with impressive detail to what extent people are in a desperate need to fill gaps in the explanation of
the world. For most people it is unbearable to wait patiently until all the
facts have been sorted out and all the relevant aspects have been thoroughly
studied. Instead, humans have a desire to receive truth right now and are
willing to take what they can get if it only fulfills a minimum degree of
plausibility.

To be fair, in an increasingly complex world they might not even have a re-
alistic chance of checking what alleged authorities tell them to be true. All
people can really do is pick the source that they intuitively trust most.
Newberg and Waldman explain with great precision and sensitivity that a
certain trust not only in one's own perception but also in second-hand in-
formation has always been necessary for survival. This is not only true for
human beings but also in the realm of animals where wolves follow the
leader of the pack blindly or where cubs grow up trusting in certain pat-
terns. Pattern seeking is a feature ingrained into our brain by evolution and
without any doubt has its values. It increases the efficiency of decision-
making anyone who constantly doubted and double-checked everything in
daily life would be clearly dysfunctional and a case for psychiatric therapy.

The problem is that is highly problematic to hand over the responsibility for
a system as fragile, huge and complex as the genetic setup of the human
brain. In other words: not so much GEHB technologies per se might be dan-
gerous but rather the potential overburdening of their users with having to
make far reaching decisions on highly complex technologies with ample po-
tential for a great variety of disastrous secondary effects. At this point it be-
comes clear that the pre-Christian theories of hubris, the Judeo-Christian-
Muslim claim for humility in the face of God’s creation and the modern phi-
losophical claim of human limits in recognizing and mastering certain ultra-
complex natural systems may come together at one focal point in which
GEHB can be found right in the middle.

7.4. Technological Imperfection Might Lead to
Undesired Side Effects: The Example of Engi-
neering Altruism

In an earlier chapter it was already explained that most traits are not caused
by a single gene, but rather are usually the result of a multitude of genes
contributing and interacting to create a mix of a multitude of traits. This makes targeted GEHB a very challenging enterprise to say the least. Some GEHB proponents define altruism as a desired goal for the application of GEHB, so let us look at what this could mean for the genetic engineer who is faced with this particular enhancement desire.

Altruism - as we have seen in another chapter above - is a quite likely target for GEHB proponents and one that is difficult to argue against. Don’t we all wish that there was less violence, more empathy and more togetherness? But these commonplace associations would still need thorough scrutiny before GEHB strategies could be developed by genetic engineers. It would have to be defined what exactly „altruism“ is before one can get started with applying GEHB technologies even if all the tools of the geneticist were already in place to manipulate whatever physical feature of the brain one desires to alter. According to the online dictionary Wikipedia „In common parlance, altruism usually means helping another person without expecting material reward from that or other persons, although it may well entail the „internal“ benefit of a „good feeling,“ sense of satisfaction, self-esteem, fulfillment of duty (whether imposed by a religion or ideology or simply one’s conscience, or the like)‟“ (Source: en.Wikipedia.org/wiki/Altruism#Altruism_in_psychology_and_sociology), March 27, 2006.

Hidden in this definition is the first problem that the GEHB engineer would encounter, namely to what extent is altruism based on cold-blooded game theory or tit-for-tat-calculations? If the answer was that altruism is an expression of increased rationality or even egotistical sophistication, then the technological approach of increasing it would be a completely different one than if altruism were a mostly emotion-based behavior that had nothing to do with self-interests. In the first case, increased intelligence and emotional control might be the proper solution. In the latter case, just the opposite – more emotions, albeit the „right“ ones - might be required. There is plenty of scientific literature supporting both of these opposing views at this point.

Those who turn to GEHB probably have an intense belief in the „power of the genes“ and would tend to see altruism as dominantly caused by the „natural“ feeling of empathy. Let us follow this path just for the sake of this brief description of varying arguments.
First we must determine: What is empathy and what causes it? Which genes trigger empathy and what would have to be done to increase the predisposition to have this feeling more often?

Oddly, one possible approach to finding usable answers to these questions would be to search at first in various studies about the variation in docility of animals that were produced in the 1990s. Most of them led to the conclusion that the genes that influence the levels of oxytocin, testosterone and serotonin in the brain might bear the main responsibility for the degree to which an individual is more or less aggressive or more or less sociable. So these could be the main determinants of altruism.

The hormone oxytocin seems to be particularly meaningful. It acts as a neurotransmitter in the brain and is released during orgasms and breastfeeding but also when processes of social recognition, bonding and formation of trust are going on. But an interesting study that was conducted by the University (ETH) Zurich, Switzerland in 2005 found that from a neuro-scientific point of view there might be many more differentiations concerning the effects of oxytocin out there than we can even fathom up to date. The study measured the trust level of people before and after the test persons had inhaled an oxytocin powder while participating in a game where they could win double or loose half of the amount of money they were given by the researchers by either trusting in another person or not. The difference in results between test persons who had inhaled oxytocin and those who had not was significant and seems to confirm what we already suspected about the function of oxytocin in social life. However, the same study also found that the partners that the test persons had to trust were not affected by inhaling oxytocin at all even though they could also win from the trust of the test persons. Also, the variance of the test persons’ behavior with and without oxytocin was only some 20% so there are clearly other forces at work that determine a distrustful behavior. The effect of the oxytocin intake made a difference even though the test persons could not see the face of the persons whom they had to trust. However, when they were told the computer would now make random decisions their trust level was no different with or without the artificial injection of oxytocin.

Interestingly, other studies on social behavior and their determinants also found a connection between the size of the chin and teeth on the one hand and the degree of the desire to integrate socially on the other hand. To put it in simple words: The more childlike an adult skull of a certain species looks like, the more likely „positive“ social behavior is to appear in this species.
This led to the theory that it is really the genetic setup of children that makes creatures more sociable as adults. The common-sense support for this theory is offered by observing domesticated animals’ behavior: puppy-like dogs with floppy ears also appear to be cuter and not as aggressive in their behavior.

If “paedomorphy” is the genetic setup we are looking for to foster altruism, then the target would have to be many thousands of genes. These would have multiple effects ranging from physical to mental to emotional predispositions which would have to be researched properly before changing any individual’s genetic setup. (See Shermer, 2004, pp. 226-227). Otherwise, what the GEHB engineers might accidentally produce instead of altruism would be an overdose of docility, juvenile cuteness and submission. The political implications of such a development could be tremendous and Huxley’s Brave New World prophecy would not be a far fetched science fiction scenario any more.

What if governments decide that fostering altruism cannot be so bad and provide incentives to their citizens to apply GEHB for more docility? Isn’t that exactly what the GEHB critics have always suspected - a slow and inexorable slide into a Huxley-style Brave New World? The potential lulling of whole segments of world society into a state of voluntary abstention from acts of freedom and from their democratic rights? A prominent conservative technology skeptic comments like this: „... the people dehumanized à la Brave New World are not miserable, don’t know that they are dehumanized and what is worse would also not care if they knew. They are, indeed, happy slaves with a slavish happiness.” (Leon Kass quoted by Fukuyama, 2002, page 6).

Isn’t this a very possible scenario when we bear in mind how willingly people followed the prophets of the eugenics movement in the first half of the 20th century, which was not so long ago?

Another difficulty of defining „altruism“ would be to define what target of altruism we find to be desirable. Again it is Shermer who provides the most useful and precise overview of the available options by pointing out that altruist feeling could relate to the family or the extended family but also to the community, nation or humankind as a whole or it could include the biosphere as well. The interesting question in our context is: What is the minimum extension of someone’s allegiance and what bonding feeling in relation to what exactly are we talking about when we talks of „altruism“?
Another question that technology skeptics frequently ask is whether genetic enhancement is really necessary to create more desirable behavior and whether our brain isn’t flexible enough already to achieve this without having to change its physical structure.

According to Shermer a constant development towards an ever higher level of altruism has been going on for a few ten thousand years now. Its emotional roots can actually be found in the realm of animals: elephants mourn when clan members die, chimpanzees have a clear social order and dolphins help each other when in need (see the research of Frans de Waal and others). These behaviors might be purely biologically caused. But altruism in its true sense is more likely a response of higher developed living creatures and especially of humans to the necessities of larger social units. Those
larger social units, in turn, came into existence because of the obvious advantages of division of labor and are today – considering the worldwide population density – an integral part of human living conditions. From the stone age clan with no more than 150 members to the modern societies with many million of members a shift from kin selection due to direct personal relations towards „kin“ selection according to more abstract and cognitive concepts like nations, religious beliefs, social class, etc., has taken place. Shermer (on page 36) quotes Jared Diamond, who studied for decades the customs of the tribes of Papua New Guinea that lived in stone age conditions: „Should you happen to meet an unfamiliar person in the forest, of course you try to kill him or else you run away; our modern custom of just saying hello and starting a friendly chat would be suicidal,…“ Today, on the contrary, even between completely hostile strangers who have never seen each other a simple white flag is a powerful tool that actually might make an enemy stop shooting at least temporarily.

If Shermer is right, then the globalization of trade, the media, tourism, etc., would ultimately lead to defining „kin“ as being all other Homo sapiens on earth. Shermer quotes a study by Lawrence Keeley to support his point. Keeley researched extensively the warlike behavior of humans over a time span of a few thousand years. He claims that there was a very significant trend towards more peace because the number of casualties in relation to the total population became less and less as human history progresses – an interesting hypothesis since it seems to contradict common belief of the world becoming a more and more violent and dangerous place (see next page).
Shermer claims that there is a measurable trend towards increasingly moral behavior and, thus, towards more „altruism“ in this sense that is clearly measurable in historical studies (Shermer, 2002, pp. 97-102).

If all this were correct, then the aspiration of fostering altruism by GEHB might not only prove to be very difficult and risky in a technological way, it might also be inefficient and superfluous in a social and economic sense. There might be a much more efficient alternative to trying to find clear enough definitions of „altruism,“ to research its genetic base and transmit this knowledge into GEHB tools with probably costly and lengthy research programs. The easy, simple, and low tech-approach would be to focus human efforts on the goals of altruism directly, for example by educating people to have a more cosmopolitan attitude and control their anger (see for example Glenn McGee in The Perfect Baby), for example, by refining and funding peace keeping mechanisms, by fostering ethics training in schools, etc.

A technology skeptic would probably question why we should go the difficult path of trying to manage our biological evolution and waste a lot of resources on this? Maybe we should first go all the way in pushing forward our cultural and political evolution as much as possible. Maybe on the way
we will find out that our current biological constitution is perfectly sufficient to serve as the basis for altruistic behavior once we succeed in providing proper moral education to the majority of the world population. Why don’t we focus on using technologies that we already have – like the Internet, the media, air travel, teaching and pedagogical methods, etc. – to make the world a better place instead of initiating huge and uncertain new technology projects?

McKibben strongly promotes this point of view and gives a few examples to underline the argument that not everything about human nature is always bad: „Legalized slavery has been scrubbed ... the end of racism... In the West, our air is a little cleaner, and we can swim in our rivers again. ...“ (McKibben, 2003, pp. 114-115). He comes to the conclusion that we humans are not so negative that we absolutely have to change our own biological setup.

In his 2006 book Moral Minds Harvard professor Marc Hauser takes a somewhat different and much more differentiated position than this. He shows that it is true that moral behavior probably depends on both Kantian deliberate thought as well as on emotional impulses such as David Humes imagined them. Hauser emphasizes that the exact mixture might depend not only on the moral decision at stake but also on the situation and individual.

But Hauser also claims that there are clearly some biological factors at work as well as can be seen when studying moral defects, for example the behavior of psychopaths of which there are an estimated 2 million in North America alone: „Most criminals are not psychopaths. The psychopath’s trademark is a lucid mind, with often clear-headed, cool, rational justification for their behavior. What jumps out of their justifications, however, is an unparalleled egocentrism, supported by a lack of empathy that most of us find foreign and frightening. Guilt is a foreign concept to the psychopath. ... The reason most of us don’t crush an ant, swat a butterfly, kick a cat, or slap a baby is because we have some sense of what it might feel like to be another living creature. We can imagine what it is like to walk in their shoes. Empathy is a fundamental link to our ethical behavior. It is a missing link in the psychopath’s mind. Evidence that it was always missing comes from longitudinal studies that trace back to their early childhood. ... Adrian Raine, a psychologist who has long studied the brains of murderers, reports that there are differences in the size of the hippocampus between successful and unsuccessful psychopaths. ‘Success’ in the current context means succeeded in actually murdering their victim; unsuccessful psychopaths were caught before killing their victim.
Based on the studies in non-human animals and humans, there is ample evidence showing that the hippocampus plays a central role in regulating aggression. In earlier studies, individuals with a variety of disorders linked to abnormal aggressive behavior have implicated asymmetries in hippocampal size, specifically larger on the right than on the left. Raine’s analyses show that unsuccessful psychopaths have a larger right hippocampus relative to the successful psychopaths and a control population of non-psychopaths. Given the connection between the hippocampus and the prefrontal cortex, these anatomical asymmetries point to a necessary coordination between inhibitory mechanisms and decision-making. Unsuccessful psychopaths are more likely to misjudge a situation and, thus, are more likely to be caught.” (Hauser, 2006, pp. 235 and 237).

Hauser also points out that there is a gender related difference in the level of aggression that cannot be explained by cultural factors and upbringing alone since they exist in all cultures: „No one teaches children to be angry and aggressive. They simply are sometimes and in some situations. Anger and aggression are capacities, present in all animals and handed down to us from our ancestors. … Within most cultures, men are more aggressive than women. Such sex differences emerge early. Little boys are often rougher during play than girls, even though girls in one culture can be more aggressive than boys in another culture. In cultures with records on driving, men are responsible for vastly greater proportions of deaths due to aggressive driving. Culture can curtail aggression or enhance it but the sex differences remain, pointing to an underlying biological difference. “(Hauser, 2006, page 233)

It seems that based on current knowledge, we might be able to control aggression by applying certain drugs, for example, and that this might also lead to knowledge on how to decrease the tendencies to be aggressive. But it also seems that enhancing more complex features like altruistic behavior is by far more difficult – at least as long as we don’t have a clear philosophical definition of what we exactly mean by „altruism” and how this concept correlates with the phenotypes of the physiology of our brain at all. The only thing we could do so far is take wild shots in a risky trial and error game of technological development. At this point any such undertaking would be clearly unethical due to the fact that risks or undesired side effects cannot be guessed in the least.
7.5. Undesired Impacts on Society: Growing Inequality as a Possible Scenario

New technologies have had undesired side effects in the past, mostly ones that nobody could have imagined before they actually happened. The establishment of the OTA (Office of Technology Assessment) by the U.S. government in 1974 and of similar offices by other Western governments was an answer to the realization that technology has many effects on a society that are complex, multifaceted and difficult to predict. The OTA was closed in 1995 and it could well be that this is one symptom of an overall trend of a decrease in the perceived societal impact of technologies. Maybe, however, it is more a sign of the resignation of governments who have come to realize that technologies cannot really be fostered or stopped by politics in an increasingly interconnected world with highly globalized trade, scientific projects, etc. So why bother spending a lot of money on useless analysis?

Let us take air travel, for example. Government authorities have a power monopoly when it comes to safety regulations. But air travel undoubtedly also has a huge impact on human societies that has nothing to do with technology safety. This becomes clear when we realize that even a medium sized airport like the one in Munich, Germany, processes around 100,000 travelers every day. There are more people seeing more of the world, trade and goods are being transported swiftly around the world, intercultural exchange is being eased, but more harm is also being done by destructive mass tourism, dangerous viruses, and travel possibilities for criminals, for drugs, etc. It seems that only in the ivory towers of sociological departments are these impacts still of interest since governments have long ago given up thinking they could foster air travel if they consider the societal impacts to be mainly positive or that they could curtail it if they think that air travel's societal impacts are mainly negative.

With genetic enhancement, however, this is different. Genetic enhancement issues have been put into the hands of bioethics councils by most governments of large and wealthy countries. In Western liberal democracies with Judeo-Christian traditions all governments are well advised to also listen to their councils if they want to avoid publicity traps. It would be incorrect to state that these councils are usually staffed with technology skeptics, nevertheless, the published reports of these councils usually do contain a lot of
technology skeptic arguments and are, thus, a good source for the following subchapters.

The major concern about the societal impacts of GEHB that can be found in almost any of the publications about genetic enhancement is the one about increased inequality between the enhanced and the non-enhanced.

In his well-known 1998 book Remaking Eden biologist Lee Silver predicts in a semi-fictitious chapter that by 2350, self-induced evolution by generally available genetic enhancement over a time span of several generations could lead to the emergence of a separation line between the GeneRich and the GenePoor – the latter he also calls the „Naturals.“ (Silver, 1998, pp. 281-293).

In the prologue to his book Radical Evolution, Joel Garreau elaborates on the inequality issue when writing about his „Hell Scenario.“ Garreau foresees the possibility of a segmentation of human society into three sections:

„... we well might see three distinctly different kinds of humans, which I have come to call the Enhanced, the Naturals, and the Rest:

The Enhanced are people who embrace the opportunities of the GRIN (= Genetics, Robotics, Informatics, Nano) technologies. They love the idea of thinking faster, living longer, remembering everything, connecting to anything, being muscular, staying muscular, never worrying about fat, conquering disease, being sexy forever. They will pay almost any price for that kind of transformation. The Enhanced are defined as those who, through modifications to their minds, memories, metabolisms and personalities, can perform feats so unattainable by original-equipment human beings as to draw attention to themselves.

The Naturals are those who have access to those opportunities but pass them by like fundamentalists eschewing modern pleasures or like vegetarians shunning meat. For esthetic, moral or political reasons, they recoil in horror from the consequences, especially the unintended ones. Naturals are original-equipment humans who have the opportunity to become Enhanced but have chosen to turn against it.

The Rest are those who, for economic, or geographic reasons, do not have access to these technologies. They envy and despise those who do. The Rest are original-equipment humans with no opportunity to become Enhanced.“ (Garreau, 2005, pp. 156-157)

We get the picture. We have already had a taste of this from reading Huxley’s Brave New World.
But the dangers of inequality are not only a concern to writers of fiction and popular science books. In his 2003 report *Beyond Therapy*, the (U.S.) President’s Council on Bioethics writes (on pp. 316-317):

„An obvious objection to the use of enhancement technologies, especially by participants in competitive activities, is that they give those who use them an unfair advantage … Yet as we saw, the fairness question can be turned on its head, and some people see in biotechnological intervention a way to compensate for the ‘unfairness’ of natural inequalities – say, in size, strength, drive, or native talent. …

A related question concerns inequality of access to the benefits of biotechnology, a matter of great interest to many Members of the Council … The issue of distributive justice is more important than the issue of unfairness in competitive activities, especially if there are systematic disparities between those who will and those who won’t have access to the powers of biotechnical ‘improvement.’ Should these capabilities arrive, we may face severe aggravations of existing ‘unfairness’ in the ‘game of life,’ especially if people who need certain agents to treat serious illness cannot get them while other people can enjoy them for less urgent or even dubious purposes. If, as is now often the case with expensive medical care, only the wealthy and privileged will be able to gain easy access to costly enhancing technologies, we might expect to see an ever-widening gap between ‘the best and the brightest’ and the rest. The emergence of a biotechnically improved ‘aristocracy’ – augmenting the already cognitively stratified structure of American society - is indeed a worrisome possibility, and there is nothing in our current way of doing business that works against it. Indeed, unless something new intervenes, it would seem to be a natural outcome of mixing these elements of American society: our existing inequalities in wealth and status, the continued use of free markets to develop and obtain the new technologies, and our libertarian attitudes favoring unrestricted personal freedom for all choices in private life. “

Surprisingly, the President's Council on Bioethics with its conservative chairman Leon Kass seems to be very much on the same line as transhumanist James Hughes with these statements, except that Hughes goes one step further and actually suggests what seems to him to be the obvious solution:

„Any enhancement that promises to make people so dramatically superior in intelligence, longevity or health that it threatens the social justice is an
obvious candidate for subsidies and universal provision, not for a ban. As bioethicist Peter Singer concludes in his essay 'Shopping in the Genetic Supermarket,' since a 'free market in genetic enhancement will widen the gap between the top and the bottom strata of our society, undermine belief in equality of opportunity, and close the 'safety valve of upward mobility,' then society should subsidize genetic enhancement services so everyone can afford them." (Hughes, 2004, pp. 233-234)

GEHB might, thus, become part of the classic conflicts of public health policies or as the book Beyond Therapy puts it (on page 318): "... the setting of priorities for research and development is an important matter for public policy; it is not unique to the domain of 'Beyond Therapy'. It cannot be addressed, much less solved in this area alone." And also James Hughes realizes (on page 234): "We won’t be able to, or want to, subsidize all enhancements, however; some will have to be left to be purchased 'out of pocket' in the genetic marketplace. So how should we decide which enhancements should be in our universal health care plans, and which should be in the market?" This very question might be at the core of future public health policies.

How relevant the question of distributive justice will be in connection with GEHB and what weight this discussion will have of course depends mainly on what the pricing of the genetic enhancement services might be in the future. The pure mechanical work of knocking in or out base elements from an embryo’s DNA to modify genes and to implant this modified embryo into the mother’s womb could become as cheap as a few hundred U.S. Dollars per case. Even today, genetic screening services are already being offered in the United States at a price as low as $ 250. Thus, it all depends on the expense for developing the necessary know-how and on the number of application cases that will contribute to the refinancing of those initial R&D-expenses. To some extent it depends on how liability for faulty GEHB operations will be regulated and insured. These factors cannot be determined at this point with any certainty, however.
7.6. Other Undesired Societal Impacts: Structural Oppression and Loss of Meaning

7.6.1. Structural Oppression

Data Protection and Privacy – the „Gattaca issue”

Why do some children of Western middle class families in their twenties become hippies, followers of an Indian sect or why do they try to set up a little shop in the jungle or a farm for organically grown food, even though many of them are highly overeducated for this kind of existence? Why do they develop subcultures that usually offer much less comfort than the mainstream culture of their parents? The most likely answer is that they all want to flee the oppressive structures of modern civilized societies. They perceive these structures to be more painful than the hardships and limitations of whatever alternative they choose. At least for a while, because most of them at some point give up the rebellion and return to wherever part of the mainstream society they came from.

The restrictions and limitations of modern civilized societies have been researched thoroughly by a great number of social scientists. This is not the place to repeat or summarize what they have found. Since attitudes towards technology is the issue here, the important thing at this point is that not all but part of the forces that seem so unbearable for the rebels stem from technology. And not only teenagers and freaks have that feeling.

From surveillance technologies (surveillance cameras, telephone surveillance, etc.) to the modern database technologies used by public authorities to the CRM (customer relationship management) tools used by retail stores, banks, Internet companies, and many other such technologies, we all have reason to fear the possibility of a serious erosion of our privacy, individuality and freedom stemming from these technological developments. The introduction of genetic technologies applied to humans is a likely next step in this development, including the systematic investigation and storage of data concerning our individual genetic codes - a scary scenario indeed. In particular if it became common to buy prefabricated genetic traits „off the shelf,” the transparency about somebody’s genetic predispositions could be even more easily obtained than now, when it still requires genetic screening.
The more genetic modification becomes standard, the more data protection could become a problem. If it should ever reach the point that humans are just a mosaic of prefabricated genetic modules then this problem is paramount.

It would be naïve to assume that genetic information cannot be used against an individual’s interest as well. What, for example, if the next upgrade of an artificial genetic code which produces much better dispositions is on the market and you are the carrier of an older version. You have to face the fate of being outdone and outdated once the new model children have grown up – but would you really like everybody to know about this? The privacy issue has already been discussed as being one of the classic issues of biomedical ethics that will reappear in a new shape once GEHB becomes relevant. The issue is particularly sensitive since the yellow press and large parts of the society like to grossly simplify. Somebody with bad genes is branded and doomed once these predispositions are known while in reality a predisposition just means that you need to invest more discipline, work and effort than somebody with a natural talent. The movie Gattaca demonstrates this problem of public perception versus differentiated reality perfectly. We all suffer with the protagonist of the movie and are glad that he makes it to become an astronaut, even though he does not belong to the new genetic elite.

**Setting of Standards**

But there is also another factor of „structural force and oppression“ that has nothing to do with the erosion of privacy. Technology also creates life circumstances that you have to follow as an individual if you want to still belong to the society and live a normal life and not the life of a hermit. For example, it is almost impossible to survive in the United States without having a driver’s license. You may reject the use of cars for whatever reason, but when you are living in the rural heartland of the United States, you can only survive in small niches if you do not want to or cannot drive a car. The same is true for owning and using a telephone, handling a computer, a television and many other technologies – the more of these mainstream things you reject the more you have to accept a life as an outsider. Thus, once a new technology is available and affordable for the mainstream of a society, you are theoretically but not practically free to choose whether you want to use it or not. You can say no but the automatic punishment for saying no is usually brutal when it comes to key technologies that everybody uses.
The same might become true for GEHB, once it is “on the market”: If all parents in the neighborhood or in the whole nation have propped up the intelligence of their children how can you dare not do the same? How can you risk that you deprive your offspring of access to certain schools that might require IQ levels that can only be achieved by GEHB? How can you say “no” and make your kid an outsider? How can you reject what everybody does once it has become easy and safe to do and all that you as a parent might have to do is sign up for a completely safe and legal GEHB intervention for your embryo that provides the latest level of achievable intelligence?

McKibben is one of the most outspoken critics when it comes to this kind of structural oppression. He puts GEHB into the great context of a development that has been going on for a long time without anybody really controlling or pushing it: “… So in the last century, the invention of the car offered the freedom of mobility, at the cost of giving up the small, coherent physical universes most people had inhabited. The invention of radio and television allowed the unlimited choices of a national or a global culture, but undermined the local life that had long persisted; the old people in my small rural town can still recall when ‘visiting’ was the evening pastime, and how swiftly it disappeared in the 1950s when CBS and NBC arrived. The 1960s seemed to mark the final rounds of this endless liberation: the invention of divorce as a mass phenomenon made it clear that family no longer carried the meaning we’d long assumed, that it could be discarded as the village had been discarded: the pill and the sexual revolution freed us from the formerly inherent burdens of sex, but also often reduced it to the merely ‘casual’. Whether all this was ‘good’ or ‘bad’, is an impossible question, and a pointless one. These changes came upon us like the weather; ‘WE’ ‘CHOOSE’ them only in the broadest sense of the words. They were upon us before we could do anything about them. You may keep the TV in the closet, but you still live in a TV society. The possibility of divorce now hovers over every marriage, leaving it subtly different from what it would have been before. What’s important is that all these changes went in the same direction: they traded context for individual freedom …”

(McKibben, 2003, page 45)

But McKibben goes further than that and explicitly formulates the ultimate technology skepticism which is actually cultural-evolution skepticism: “… From a certain vantage point, meaning has been in decline for a very long time, almost since the start of civilization. Our hunter-gatherer ancestors in-
habited a very different world from ours, a meaning saturated world where every plant and animal was an actor the way people are actors, where even rocks and mountains and canyons and rivers could speak. We look at the same world and see either silent landscape or piles of resources; either it has gone mute, or our hearing is nowhere near as sharp."

(McKibben, 2003, page 44)

McKibben – an author who has published mainly on ecological issues and is, thus, probably considered secular-leftist – even regrets the disappearance of the medieval church and the „disenchantment of the world“ (Max Weber) in this context.

**Loss of Meaning**

What these vague and abstract fears of loss of meaning really contain one can only find out by analyzing the wordings that McKibben, Fukuyama, Kass and Garreau use in their books very carefully and by interpreting what is not explicitly written but what we can read between the lines.“ The following issues are the major ones that could be filtered out this way:

„*Mental and Emotional Impoverishment is Loss of Meaning*“

There might be a loss of variation in human life because there will be selection pressure in favor of a certain kind of enhancement and a pressure to eliminate other traits. For example: „... It may be hard to find genes for, say, dreaminess“ (McKibben, 2003, page 59). The reduction of diversity of traits that will come from the elimination of seemingly useless traits might lead to an unintended impoverishment also of human life. McKibben quotes Martha Nussbaum as saying (on page 58): „Many of the most creative and valuable human lives are the result of particularly difficult struggles.“ Genetically programmed traits may give the same feeling to their carriers that a visit to Disney Land or a visit to an ethnic food court gives to the average middle class American, providing no more than a poor imitation. But since everybody follows that line of consumption and there is nothing else available, it might be perceived as the good life, even though visiting the foreign countries and feeling the weather, tastes, smells, noises and images is the REAL THING, and the real thing alone can provide the complete range of experiences and flavors.

The danger according to technology skeptics is, thus, an impoverishment of mental and emotional life that we will regret later when it is too late to go back. No institution, let alone any single individual, will then be powerful
enough to turn history back. The proponents of this argument face two difficulties: on the one hand it is often difficult to tell the difference between a mimic and the real thing and secondly, what consumers ask for is not what they really want. When we eat fast food, have we been forced by structurally oppressive situations (stressful lives, short lunch breaks, etc.) to give up quality „slow food”? Have we really been forced into a bad deal or did we just make a well-considered and legitimate choice to save time in exchange for culinary quality? This question is for most of us probably not easy to answer but the GEHB variant of this question could be a lot more challenging still.

„There would be Boredom without Struggle and Challenges“

The implicit argument behind this claim is that if human struggle is eliminated by genetic programming, the lack of real challenges might lead to infinite boredom and to the inability to feel really satisfied. Many authors who argue on the technology-skeptical side claim that achievements that can be handled by human discipline need not be the target for applying technological overkill. Take an eating sugar control as an example. It is correct that evolution did not equip us with a well-functioning stopper for eating sugar since a sugar-eating-stopper would have been a useless trait during the previous 99% of the lifespan of the species Homo sapiens. During that entire period the main biological problem was finding enough sugar-containing food and not reducing its consumption. But is that really a reason – the technology skeptics ask - to manipulate the human brain with unforeseeable consequences? Isn’t it enough to just watch our eating habits a little as billions of people obviously are and have been able to do? As the President’s Council on Bioethics puts it in its 2003 book „Beyond Therapy“ (on pp. 328-329): „Many people believe that each person should work hard for his achievements. Even if we prefer the grace of the natural athlete or the quickness of the natural mathematician – people whose performances deceptively appear to be effortless – we admire also those who overcome obstacles and struggle to try to achieve the excellence of the former. This matter of character – the merit of discipline and dedicated striving – is surely pertinent. ... In most of our ordinary efforts at self-improvement, whether by practice, training, or study, we sense the relations between our doings and the resulting improvement, between the means used and the ends sought. ... In contrast, biotechnological interventions are directly on the human body and mind to bring about their effects on a passive subject, who
plays little or no role at all. He can at best feel their effects without understanding their means in human terms.”

Even the respect for the feeling of pain and suffering that was described in an earlier chapter as a typical feature of the Christian culture has secular proponents. For example, Joel Garreau, (on page 162 of his 2004 book) quotes Fukuyama: „There is something about the experience of pain and longing and anxiety and all of these things that our therapeutic society wants to get rid of. It is somehow necessary to our self-understanding of what we are as human beings. … You can’t have courage without risk. You can’t have real compassion or sympathy without the personal experience of pain.“ It should be pointed out, however, that this view is not fully shared by most modern brain researchers. They claim that the emission of good feeling neurotransmitters in the brain does not necessarily depend on bad feeling neurotransmitters having been present previously. A pleasure increase is possible by delaying and rotating the various factors that lead to the emission of all the feel-good neurotransmitters like endorphins. (See Klein, 2002 for a good overview on this subject). So this last point of the good purpose of pain might be going too far and certainly is regarded by technology-positivists as a Calvinist theory in a secular disguise.

„By Pursuing Positional Enhancements, Frustration is Assured“

Especially with what transhumanist Nick Bostrom calls „positional enhancements“, disappointments are almost assured. According to Bostrom, positional enhancements are those that are not „intrinsically rewarding“, but that try to improve the relative position of an individual or a group of individuals in relation to the rest of society (See Hughes, 2004, page 238). For example, if parents believe they might improve the chances of their children to get into Harvard University by applying GEHB methods for more intelligence, this will almost certainly turn out to be a frustrating illusion if and when the same GEHB technologies are available to all other parents.

It is easy to imagine that a costly and harmful „biological arms race“ could be imposed upon not only all parents but also on all nations, (or other types of communities) that lead to hasty and poorly considered enhancement decisions just in order to keep up with the ever increasing „normal standards.“ Humans would then indulge into an enhancement race that would bring as much human progress as a hamster advanced in covering a distance in a tread mill: zero. GEHB would then be an empty and useless endeavor per-
formed because of the structural oppressive force that the technology imposes on humanity without value for improving human conditions and most likely it would even worsen these human conditions.

7.7. Human Limits

In the end, behind all these worries and concerns are two of the most fundamental philosophical questions that have existed ever since humans started philosophizing:

- What is a good life? And:
- What are human limits that we should not pass?

Let us focus on the latter in this subchapter.

Since human limits are very much also a theological topic, it is in a theological text, written by Ronald Cole-Turner, professor of theology and ethics in Pittsburg, where a very precise description of what „human limits“ means in the context of genetic enhancement can be found. As one can easily see, this text is in fact written in a rather secular way in its core statements:

„The central question for our consideration is whether human inheritable genetic modification would violate a fundamental human limit. Theology takes the question to its ultimate level, asking whether such a technological intervention violates our creaturely limits by somehow offending against our relationship with our creator. But we encounter this question of limits at many points before this ultimate stage. For instance, among human limits are the obvious limits of human knowledge. We may not now understand a certain process, or we may be limited by our lack of knowledge of a natural system in its full complexity, which is certainly the case when we contemplate the genetic and cellular complexity of our own brains. Theologians of various traditions, especially Christianity, have stressed the need for great modesty about human knowledge.

Perhaps more important, they (together with philosophers as far back as Plato) have stressed the importance of self-knowledge and its limits. Do we really know ourselves? Do we deceive ourselves, thinking we are morally or intellectually better than we really are, or that we are less self-transparent than we like to think? Are we each not in fact a conflicted set of motivations
and aspirations, wanting this and that, wanting good and selfish ends, wanting to be good but only partly wanting it, all the while deluding ourselves about the purity or coherence of our purposes, and thus limited in respect to our clarity of purpose? ... Excessive confidence about our ability to control one part of a system might blind us to our limited ability to control another, much less to determine the system as a whole.” (Ronald Cole-Turner „Human Limits“ in: Chapman & Frankel, 2003, pp. 189190)

In the same book (Chapman & Frankel, 2003, page 213), the theological-philosophical thought of human limits is taken one step further and merges into the most fundamental kind of technology skepticism:

„Many religions understand humans as limited not only by their ability to see and comprehend fully, but by the human creaturely condition, driven by hungers, temptation, passion, and the fear of death. Linked to our concern that our enthusiasm for the sciences might blind us to its effects is the worry that our temptations for power or dominance might similarly confound our ability to control the use of this technology. ... It is a theme that underlies many theological and philosophical traditions, the fear that knowledge is hubris, threatening the very order of the world.“

(Laurie Zoloth „Uncountable as the Stars“, in: Chapman & Frankel, 2003, page 213)

Many of the publications on genetic enhancement, most prominently Silver, Stock and Garreau, implicitly or explicitly assume that GEHB will arrive sooner or later. McKibben refuses to accept this deterministic thinking and almost preaches that the respect for human limits is not only a philosophical-theoretical necessity but that it is absolutely possible to implement it in reality: „According to the technotopians we will do it. We have no choice; we inevitably push forward. It is our destiny, and destiny is inescapable. ... Just one small thing which the apostles of our technological future have overlooked. ... What makes us unique is that we can restrain ourselves. We can decide not to do something that we are able to do. We can set limits on our choices. We can say ‘Enough’. ... It is this ability to limit ourselves .... That makes us unique among the animals.” (McKibben, 2003, page 205+208)

„We“ in McKibben’s writings is the society as a whole and whole societies are governed and managed by politics. This takes us to the realm of biopolitics.
7.8. **Summary and Conclusions**

The most important concerns of secular technology critics can be summarized in the following graphic:

<table>
<thead>
<tr>
<th>Unintended Side Effects</th>
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</thead>
<tbody>
<tr>
<td>Physical</td>
</tr>
<tr>
<td>Psychological</td>
</tr>
<tr>
<td>Societal</td>
</tr>
</tbody>
</table>

**Physical Side Effect:**
The germline modification did not work as intended or has other physical consequences for the enhances child

**Psychological Side Effects:**
The germline modification did work as planned but it does not feel as good for the enhanced child and/or for the parents as they had thought it would

**Societal Side Effects:**
A great number of cases of germline modifications of some kind has implications for all members of society or at least for a large segment of it

While these concerns may seem somewhat abstract and maybe even exaggerated when they are analyzed only in relation to a non-existing and futuristic technology like GEHB, they gain enormous weight immediately when they are applied in the historic analysis of past technology failures. Interestingly, one of the most devastating and grave technology failures happened in the immediate scientific proximity of genetic enhancement which is the eugenics programs of the 20th century. Even more interestingly, it was not really a failure of the scientists and “engineers” in a narrow sense that caused the main part of the human catastrophe. Rather than that, it was the application and distortion of half-digested scientific knowledge by the broad public including the political elite that caused the bulk of the problems.
So could the same tragedy that the eugenics movement caused in the 20th century happen again if genetic enhancement technologies are developed and released for general use too quickly and with too many myths attached to them? Could it happen again that the broad public develops distorted images of scientific facts that are based on sloppy research and on wishful thinking rather than on sound empirical facts? Could it happen again that a lot of human suffering is brought about by a good idea being applied in the wrong way by many millions of people? Is GEHB so complex a technology that a modern 21st century version of hubris is the most logical consequence if this technology is released for the general use by average parents?

A transhumanist would point out that no technology has ever been risk free, but that this fact has not and should not keep us from going forward. In contrast, a technology critic would answer „yes” to all of the questions above, pointing to the historic example of eugenics and the cruelties that it entailed. The media attention that surrounding the discovery of the human genome and the discussion on cloning and stem cell research of the last ten years has subsided somewhat, but the debate still rages between transhumanist views and technology skeptics in academic circles.

One thing has become very clear from the intellectual discussion during the last ten years: there will be no „scientific” solution to the ethical discussion about genetic enhancement in general and about GEHB in particular – this is the main message that this whole part III on the philosophical views on GEHB should teach us. It is not the geneticists and neuroscientists who will, should and can dominate the discussion about GEHB. For the policies of the future concerning the regulation of GEHB, politics will and should play the major role, politics in its original and fundamental sense of a competition of views and arguments and a struggle for the right to determine how the common life of human societies is organized.
PART (IV) POLITICS
8. THE BIO-POLITICS OF GEHB

8.1. Introduction of a Focused Analysis of the Most Relevant Issues

8.1.1. Overview

The term „bio-politics“ is used for describing the public debate on a great variety of topics concerning not only genetic engineering, but also others, ranging from human reproductive technologies to animal rights to ecological-biological issues in connection with transgenic food crops. It is, thus, not a clearly defined area of politics at all. This fact has not kept transhumanist author James Hughes from „mapping the field of bio-politics,“ which he presumes to be the predominant field of politics in the 21st century. He also believes, not surprisingly, that genetic enhancement of humans will be in the center of attention of future bio-politics. This is his political model for the near future (Hughes, 2004, page 70):
Hughes describes in a very elaborate way how the old categories of left and right will become invalid, since even today opinions on genetic enhancement are already shared by coalitions that cut across the old progressive-conservative divide. He explains: „On the matters of personhood-based citizenship, natural laws, and individual rights and the ‘yuck factor,’ libertarians and democratic transhumanists are on the same page. But on the questions of regulating technology, the democratic transhumanists side with most of the rest of the world against the libertarian and Luddite extremes: appropriately regulate technology and avoid bans. On issues ranging from social equality and joblessness to ecological protection and globalizations, the libertarians argue for the judicious government regulation and universal social provision. … “(Hughes, 2004, page 216)

This book is not the place to evaluate to what extent this analysis meets generally acceptable criteria and to what extent the facts that this alleged scheme is based on are correct. Instead, I would like to offer in the text below a simplified and altered version of Hughes’s scheme as a guiding map for the description of the political issues in connection with GEHB that would facilitate and focus the further description to a great extent:
The two axes of this model explain the various positions, not towards biopolitical issues in general but on the concrete field of the politics of genetic enhancement, with a particular focus here on GEHB.

The horizontal axis „Parental Liberty versus Government Regulation“ describes the old conflict between libertarian and communitarian views on parental versus societal priorities in education applied to the topic of GEHB: either the parents will be allowed to make the genetic enhancement decisions for their future children’s brain or they will be limited in their decision-making freedom by laws and regulations issued by the government.

There is no clear political black-or-white type decision necessary since there are many possible shades of limiting parental freedom only partly by more or less subtle pressure. On the mild side there could be obligatory counseling, for example, prior to decisions on GEHB. More immediate but still not absolute government intervention could take place by using money as leverage. For example, health insurance could be designed such that it does or does not cover certain types of GEHB or by funding or by not funding relevant research with tax money, and so forth.

But in the end what gives government the final say and the ultimate bite is the means of legal restrictions. As long as GEHB is prohibited by law, parents will have a hard time finding a doctor who risks going to jail for performing GEHB just to do some eager parents a favor or because of the money they might pay him. Like everything that is illegal it would not be completely impossible, in particular when doctors in another nation are allowed to provide the service (see the case study on abortion laws in Ireland above) but would be rendered more difficult and thereby more unlikely to happen.

The vertical axis in the end shows the degree to which a deviation from the results of the „natural lottery“ is considered permissible. For pragmatic reasons the terms „therapy“ versus „enhancement“ seem to be the most illustrative, in spite of all the devils that are in the details of clearly delimiting the two from each other. Even though the distinction between the two in the form of exact definitions is very difficult for scientists and lawmakers (see above chapter 3), the basic principle is still intuitive for most people. At some point in the future most people will probably consider diseases like Huntington’s, Alzheimer’s or clinical depression to have such devastating consequences for the concerned individuals that fighting them with germ-line interventions will become acceptable. Most people will most likely fol-
low a virtue-based ethical judgment here: If GEHB is applied with the intention to cure and not for vanity then it will probably be accepted. Basically the whole medical profession is built on the ethical assumption that it is a good thing to change biological destiny when it is a benevolent act of healing. On the other hand, most people will also intuitively realize and agree that there are certain enhancements that do not justify a deviation from nature, such as making people need no more that one hour of sleep or creating photographic memories. Most people will agree that these examples are definitely purely enhancements, not therapy, since most of today’s humanity lives without them.

There might be a large grey area between the two, but maybe the „virtue-approach“ discussed in an earlier chapter really is the best method for making the distinction between therapy and pure enhancement. This was also pointed out by the President’s Council on Bioethics: „When a physician intervenes therapeutically to correct some deficiency or deviation from a patient’s natural wholeness, he acts as a servant to the goal of health and as an assistant to nature’s won powers of self-healing, themselves wondrous products of evolutionary selection. But when a bioengineer intervenes for non-therapeutic ends, he stands not as nature’s servant but as her aspiring master, guided by nothing but his own will and serving ends of his own devising.“ (Beyond Therapy, 2003, page 324)

Based on this two-dimensional, common-sense approach I would like to suggest a subdivision of the bio-politics of GEHB into six segments as outlined in the graphic above:

1. Liberal biomedical politics
2. Patriarchic biomedical politics (are you sure about the word „patriarchic“? it exists, but I don’t really understand it in this context)
3. Moderate libertarian transhumanism
4. Moderate communitarian transhumanism
5. Communitarian species alterations
6. Radical libertarian technology enthusiasts

I would dare forecast that in the very long run only three of those fields will still be a matter of philosophical and political discussion, namely the three fields with the numbers 3, 4, and 5. Let me argue for this proposition in more detail.
8.1.2. Therapy versus Pure Enhancement and the Enforceability of Bans

One of the issues where I foresee a solution following well established patterns of decision-making is the axis „Liberal versus Patriarchic biomedical politics.“ The issue is basically the degree of regulation of potential GEHB interventions performed with the clear goal to heal. There might be hot issues within this field like the abuse of healing technologies by actually „healthy“ people (think of Ritalin, Viagra, Prozac, etc. as a parallel case), but above all the safety of technology matter will be the major concern in this debate. I predict that this very fact will sooner or later make the discussion about liberal versus patriarchic biomedical politics a matter of experts’ decisions to a great extent.

Public debate is not a realistic forum for deciding whether a certain treatment for Huntington’s disease or for Alzheimer’s by germline interventions should be made generally available to all parents or whether there should be restrictions on its use due to safety concerns. Questions of a more technical nature like this can hardly be the right stuff for election campaigns and votes in parliaments. Therefore, it will sooner or later be the FDAs and the expert commissions of this world who will be making decisions of this kind. And even though there might still be emotional differences of opinion amongst members of the same society or differing legislation between the countries on the subject, there will also be a political compromise in place at some point on how to handle parents’ desires to apply GEHB technologies and the implementation of the relevant rules will then have been delegated to the medical doctors, hospital administrations, ethics commissions and maybe also to counselors with a supervisory function. This is how it happened in case of IVF and abortion and also is very likely to happen to GEHB variants claiming to pursue a purely therapeutic purpose.

For purposes of illustration it may be interesting at this point to read what Leon Kass wrote in 1979 about IVF: „life in the laboratory … declare themselves independent of their bodies, in this ultimate liberation (this previous sentence is confusing-the verb is missing from the quote). For them the body is a mere tool, ideally an instrument of the conscious will … Yet the blind assertion of will against our bodily nature... can only lead to self-degradation and dehumanization.“ Quoted by Hughes, 2004, page 84, who
enjoys pointing out that this view of Leon Kass would be considered completely ridiculous today. In fact, to Gregory Stock, even Leo Kass himself denies today ever having been against IVF. So this is how quickly the attitude towards a technology that becomes generally accepted can evolve. I predict that therapeutic GEHB will go exactly the same road. Biomedical „politics“ on therapeutic GEHB will, therefore, only remain political in a very narrow and functional sense of the word and will not remain on the agenda of seminars of political science departments of universities, or of political debates amongst families and friends.

I even foresee a consensus towards this development from organized Christianity evolving over time. The following passage of a text written by Sondra Wheeler, Professor for Christian Ethics at the Wesely theological seminar shows the argumentation that might come up once the time is ripe: „… genetic interventions aimed at increasing or enhancing positive characteristics, even real goods such as intelligence or creativity, cannot be defended as essential to well-being and should be forgone. At the same time, the possibility of correcting identifiable genetic errors that can create severe dysfunction, grave illness, and suffering as well as early death do seem to conflict with God’s will for human flourishing in the same way as other serious disorders.“ (Sondra Wheeler „A Theological Appraisal of Parental Power“ in: Chapman, 2003, page 250)

Apart from this, a total and worldwide ban of germline engineering and GEHB for therapeutic purposes might not be feasible in the long run. For one thing, it would be much too difficult to enforce, considering that the field of human reproduction is considered by most people to be extremely private and intimate. It would be very difficult to supervise and control in cases where the parents the doctors potentially agree about something and just go ahead. Speculations on existing clones already running around in kindergartens today illustrate this problem: How would one be able to distinguish whether a germline intervention has been performed on somebody unless there are serious and obvious health problems that cause a revelation of the intervention? In 10, 20, or 30 years with technological progress progressing rapidly, this is not a far fetched scenario at all.

It would take a constant and very impossibly intrusive surveillance of all medical stations that work with reproductive medicine to fully assure that no case of any modification of a faulty Huntington gene or any other genetic modification ever happens anywhere in the world. And if it did happen, what are the authorities of liberal societies going to do with the culprits
once they are caught? Throw them into jail because they wanted the best for their child with the yellow press then jumping on such a controversial topic?

I rest my case: a total global ban on all GEHB might be a theoretical idea of radical anti-GEHB advocates today, so long as the technology does not exist, but as a large scale reality for a future when the technology is available it is not going to happen.

As we have seen, there is probably not even now a political majority supporting a total ban of GEHB at all. The opinion surveys quoted in the subchapter on „Market Forces“ above supports that argument. In most of these surveys it turned out that there is a majority of people in many countries in favor of germline modification if it serves purely medical and therapeutic purposes.

With scientific advancement providing more and more prospects of safe GEHB techniques for eliminating genetic diseases, people will get used to the idea. In the end only a small minority of people might be left over who still share the opinion of Ted Kaczinsky, (isn't there someone else you can quote who is more scientifically serious?) the „Unabomber“ anti-technology-terrorist, who wrote the following lines and blackmailed the media into publishing them: „Man in the future will no longer be a creation of nature, or of chance, or of God (depending on your religious or philosophical opinions), but a manufactured product... The only code of ethics that would truly protect freedom would be one that prohibited ANY genetic engineering of human beings. ... You can’t get rid of the 'bad' parts of technology and retain the 'good' parts ... The temptation presented by the immense power of biotechnology would be irresistible, especially since to the majority of people many of its applications will seem obviously and unequivocally good like eliminating physical and mental disease, ....“ Ted Kaczynski killed three people with his bombs and maimed 23; when he was tried he rejected the insanity defense to make his point that he is not insane but just off mainstream thinking. (See Hughes, 2004, page 117).

8.1.3. Radical Views and the Likely Focus of Future Bio-Politics

Seen from the side of therapeutic GEHB, on the other end of the spectrum of views are those of the radical libertarian technology enthusiasts. There have
always been enthusiastic advocates for all kinds of technologies. These are the so-called „early adapters“ who have always welcomed new technologies precisely because they are new, exciting, promising and different. But I will dare to make another prediction here: The views of radical libertarians and technology enthusiasts on GEHB will never make it to be mainstream enough to really dominate politics.

My main and simple reason for believing this is that the mainstream is almost never radical in anything. Neither do human societies want parents to be completely and totally free in their decision-making about the future of their children (this will be explained below in more detail), nor are the typical mainstream people who have had an average middle class education – at least in North America or in Europe – completely free of any of the technology-skepticism of the early 21st century (see above). The attractiveness of exaggerated and freakish „technology-pornography“ (what is this?) may also be a question of an individual person’s age – only the very young are likely to believe in the idea that technology is able to deliver solutions for virtually every human problem or desire that there is. With age usually some caution and realism begin to color people’s decision-making and ethical judgment.

What is to be considered „radical“ may change over time, however. To plan a building that is over 10 stories high was certainly a bold and radical step at some point in the past by the first architect who did it, while high rise buildings with 50 stories are commonplace in large cities today. Thus „radical“ is a notion that needs to be redefined once in while and any new definition might have to come with a label saying „Requires periodic revision“. Visions of GEHB leading to superhuman sensory experiences, superhuman intelligence and memory and yet unknown extents of emotion control and emotion intensity are not only unfeasible but would also be considered radical by most humans at this point. They would be considered radical in this sense and thus are rejected as too extreme and too disturbing. Of course there will be discussions on what that exactly means and there will be complicated cases that bear the potential to push the limit further and further of what is too radical. This process, however, will at the same time change the image of what is radical and what isn’t.
8.1.4. Focus Areas of Future Politics concerning Genetic Enhancement

If you are willing to follow me in these assumptions then this would mean that only three of the six segments of the future fields of bio-politics that are listed above are left as the highly relevant hotspots of bio-politics in the coming decades:

- Moderate libertarian transhumanism
- Moderate communitarian transhumanism
- Communitarian species alterations

For these three segments, a few crucial questions will emerge as the core elements of future bio-politics. These will stay intensely political and might even become very important issues in the political debates of the coming decades in general (even though maybe not THE most important issue, as James Hughes assumes). They are:

1. Where exactly are the limits between therapy and moderate enhancements? How can lawmakers and controllers assure that the therapy-argument is not abused to push parent-controlled enhancement-possibilities further and further beyond the limits of legitimacy?

2. What are „moderate” and „radical” enhancements exactly? One could imagine, for example, that moderate enhancements could be defined as the elevation of the biological underprivileged to the general standard level – to come back to the example with the IQ this could mean the rule of thumb: „Up to today’s standard 100 is okay.” But this will be the object of fierce debates. The outcome is by no way certain today, and constantly shifting definitions of what is radical or moderate makes things even harder to decide.

3. Are there any changes of the biological setup of the whole population that might seem quite radical today but that seem to make so much sense that they will become an issue of bio-politics quite soon?

This last question needs some further explanation and I will try to do this by providing an illustrative example: Preventing the general population from developing obesity has turned into one of the major challenges of public health policies in some Western countries, above all in the United States. Currently, in the United States some 58 million people are considered seriously overweight and it has swiftly become the number one cause of death.
Seen from this perspective, the emergence of using even radical technological solutions as part of the government’s health promotion policies is not just a far fetched vision. The feeling of hunger and individual metabolism, the two main determining factors for the likelihood of becoming overweight - are created by certain chemicals in the brain. Once we know all the mechanisms of how they are produced and how and to what extent their functioning is genetically predisposed, the temptation might be just too compelling for future politicians to make the implantation of „obesity blockers“ into the DNA of unborn children obligatory by law.

We have obligatory vaccinations and sanitary laws today, so why shouldn’t certain GEHB applications follow that same pattern one day? To say that future governments my consider species alterations would trigger an outcry of resistance or an incredulous look from most people today. But does that mean that the species altering implantation of obesity blockers into the brains of hundreds of millions of people by means of GEHB will be excluded for all time? I do not think so. It all depends on when is the right time and then everything is potentially possible. But it will nevertheless be a hotspot of bio-politics once an idea of this kind is first proposed and this is the point here.

I will now turn to the fundamental questions of practical bio-politics. Even though they are in reality old questions applied to new issues, they will in the opinion of most authors who wrote on genetic enhancement undoubtedly be core issues of future bio-politics as well. They can be categorized in two headlines:

- Parental liberty and its limits
- The if, when and how of government interventions

### 8.2. Parental Liberty and its Limits

#### 8.2.1. The Importance of Parenting

The importance of the parent-child relationship is described in a well formulated way by Sondra Wheelers, professor of Christian ethics at the Wesley theological seminar; it is described in such a way that presumably
most people - including non-Christians and non-religious people - would agree to the following passage maybe with the exception of radical communist ideologists:

“... strong and effective ties between parents and children are essential for the successful nurture and formation of individuals. Nothing is more critical to child development than the presence of a consistent, powerfully invested caretaker who provides not only protection and physical care, but also the context for psychological growth and stability. It is within this primary care relationship that both the ability to identify the self with others and the ability to differentiate the self from others are formed. Those who are deprived of this intense relationship, in which the young child has an individual personal identity ascribed, affirmed and reflected by an attentive caretaker, may fail entirely to develop a stable sense of self. The absence or failure of such a relationship is a devastating loss in a child’s life, whose effects are unpredictable and far-reaching. In the overwhelming majority of cases, this crucial relationship is not just a matter of individual well-being. The broader community also depends on this structure to accomplish the enormous, long-term and labor-intensive task of child rearing. These include material support, daily physical and emotional care, basic education in language and culture, and socialization into the customs and norms of the community. There is no failure as costly to a society as a failure in this primary arena of nurture and formation, none so difficult to repair or compensate for as the breakdown of this most fundamental social relation. Those who do not learn to bond and empathize with other human beings through its interpersonal connection, who do not learn how to function within the group of which they are part, are at best handicapped in their social relations. At worst, they are dangerous.” (In: Chapman, 2003, pp. 240-241)

The question, whether this crucial relationship is affected in a negative way by the parents applying GEHB is, therefore, not to be taken lightly. It is such a crucial question that virtually all the authors writing about the pros and cons of genetic enhancement give this question some thought. On the other hand, it probably does not come as a surprise that the various statements of the publications studied for this book give a very inconclusive picture.

Basically the two main issues in the debate about parental liberty concerning the decision-making about genetic enhancement are:

- That the quality of the relationship between children and parents might change to the worse and that this would not only affect the
personal happiness of each individual family but that this would also affect the society as a whole in a negative way.

- That parents will make wrong decisions and, thus, negatively affect the future of the individual offspring and, if and when this happens in large numbers, the future of the whole society will be affected negatively as well.

In the first case the question is whether the parents have to be protected from their own lack of wisdom just like heroine is illegal simply because the general population is not wise enough to stay away from it. In the second case the future children and the future generation is the object of concern and the question is whether it is ethical to put limits to the parental autonomy based on the assumption that the lack of parental wisdom could result in unacceptable harm.

8.2.2. „GEHB will Deteriorate the Relationship Parents – Children“

For Christian-religious thinkers like Sondra Wheeler the fact that the parents have a „... delegated authority, exercised as God’s agents and not as God’s replacements ...” means that, „... one of the decisive facts about parenting is that when we enter into the relationship, we don’t know who is coming.” And this, in turn, means: „... our children are not for us and not ‘ours’ in any ultimate sense. They are not our possessions or our projects, nor are they our responsibilities on so sweeping a sense that they can permanently be deprived of liberty and responsibility in the name of our exercise of care.” (Chapman, 2003. page 244)

On a more secular page, author McKibben warns about the „commoditization“ of the parent-child-relationship in his own, very illustrative way:

„Perhaps the programming doesn’t work very well, and your kid spells poorly, or turns out moody, or can’t hit the inside fastball. In the present world, you’ll just tell yourself that that’s who he is. In the coming world he’ll be, in essence, a defective product. Do you still accept him unconditionally? Why? If our new Jetta got thirty miles to the gallon instead of the forty it was designed to get, you’d take it back. If necessary, you’d sue. You’d call it a lemon."
Or what if the engineering works pretty well, but you decided, too late, that you’d got the wrong package, hadn’t gotten the best features? Would you feel buyer’s remorse if the kid next door had a better ear, a stronger arm?

Say the gene work went a little awry and left you with a kid who had some serious problems: what kind of guilt would that leave you with? Remember, this is not a child by the random interaction of your genes with those of your partner – this is a child created with specific intent. Does ‘Consumer Report’ start rating various bio-tech offerings?

What if you had a second child five years after the first, and by that time the upgrades were undeniably improved: How would you feel about the first kid? How would he feel about his new brother, the latest model?

The other outcome – that the genetic engineering works just as you had hoped – seems the least as bad. Now your child is a product. You can take exactly as much pride in her achievement as you can take pride in the achievements of your dishwashing detergent. It was designed to produce streak-free glassware, and she was designed to be sweet-tempered, social and smart.” (McKibben, 2003, page 59)

„If the programming works ... then you will have turned your children into an automaton of one degree or another; ...“ (McKibben, 2003, page 50)

Another worry (see for example Garreau, 2004) is that the gap between the generations might be widening simply because loving and supporting parents will almost automatically choose enhancements for their children that will make them superior to their parents – what else would be the point of genetic enhancement? This, in turn, could mean that children are so superior that there inevitably is an estrangement happening between the generations. Just like today the great-grandparents of any 15-year-old might have difficulties following what the grandchild already knows about sex, the internet, drugs, etc. the divide may already open between 30 year old parents and their 10 year old kids to an even much greater extent when enhanced offspring can grasp logical problems much faster, have photographic memories and are not so easily depressed. It could well be that parents are left with the choice to either leave their child „natural“ i.e. non-enhanced and thereby disadvantaged, or to enhance their child into a stage of absolute superiority in relationship to themselves. How would you like the prospect of being the mother or father of a child that is designed such that it will be superior in intelligence and discipline to you at age five or ten? That he or she will grow up to be as superior to you at age 25 as you
are to your dog? Would this prospect influence your judgments about the
technology of genetic enhancement of the human brain and would you still
be able to give an unbiased assessment only taking into account the best in-
terest of your children?

Children who learn about the possibilities of genetic enhancement will also
analyze the parents’ decisions concerning the own genetic endowment and
will come to a positive or negative judgment about the parents’ decision-
making. Will children then criticize and condemn parents for having made
bad decisions? Will they reject and resent the parents’ power to make ge-
netic decisions and rebel to a much greater extent against their parents then
they do now against the parent’s inevitable attempts of „non-genetic pro-
gramming“? Will they blame their parents when they are depressed or con-
fused for having made the wrong decisions about GEHB prior to their birth?
And what makes this scenario even worse: Once GEHB is common practice
in a society parents are trapped – deciding against any form of GEHB and
leaving the child to the natural lottery will then also be a deliberate decision
with all the potential consequences as just described.

These worries are all completely exaggerated and nonsense, say proponents
of genetic enhancement. All the theories about the effects of GEHB on the
parents-child-relationship are flawed in their basic assumptions: Genetic
enhancement is hardly „programming“ in a sense of producing an automa-
ton as McKibben thinks. GEHB is a continuation of parents choosing more
educative toys, better schools, private tutors, social activities, etc. for their
offspring. In other words: GEHB is an extension of traditional education by
other technological means.

Why should parents regard their offspring as a product when they try to
give them the best genetic preconditions possible unless they regard them
as a product already now, for example by pushing them into ambitious
sportive of artistic careers? In other words: Yes, the wrong parental attitude
can be a problem in the parents-child relationship but the use of GEHB
technologies is not the cause of this wrong attitude and will also not initiate
or foster it. It is either there or not and if it is there it cannot be prevented by
preventing the parents from using GEHB. In case parents have the „right”
attitude towards their children – why not letting them use all the means
available to nurture them including GEHB? Isn’t the „commoditization” of
children already a problem when parents choose the schools for their kids?
Aren’t kids always a product of their parents’ actions and decisions to some
extent?
Also, the concern that a wider gap in genetic predisposition between parents and children will cool down their emotional relationships is completely illogical, the pro-genetic enhancement faction says. Watch the movie „Superman” and you will get to see an – admittedly quite corny – Hollywood-vision on how such a relationship could work out just fine. Also today it is normal that at some point the children are not nurtured any more by their parents but that it works the other way round – the old, fragile and thus inferior parents then depend on the nurturing of their kids. What would be so terrible if parents experienced this point not when they are in their 80s or 90s but much earlier, say, when they are in their 20s or 30s because their kids are already so much superior to them?

Hughes points to the fact that when in IVF came up, the same prophecies of dehumanization and commoditization were brought forth (see for example the quote of Leon Kass from 1979 above) but that they proved to be false in the end. „A decade of large studies also finds that children conceived with artificial insemination and other infertility treatments, ‘children of choice’, are just as well-adjusted, and in some cases more loved, than ‘children of chance’. … In fact, just like birth control, abortion and family planning, germinal choice is likely to increase the fit between kids and the desires of their parents, making both happier in the long run. Transhuman technologies will actually strengthen families by helping to ensure that every child is an even more wanted child, including all their various traits.” (Hughes, 2004, page 134 and 135).

A cooling down and a deterioration of the parents-children-relationship – so the proponents of GEHB say, is only conceivable if and when the concrete enhancement acts specifically target those neurotransmitters or areas in the brain that are responsible for creating the feelings of warmth and closeness that dominates a normal parents-child-relationship. Only if GEHB is specifically performed to deteriorate this relationship are we worse off than today. But which parent couple would seriously consider this and why?

8.2.3. „We Must Protect the Future Children and Society as a Whole from the Parents’ Bad Decisions”

Parents do have and should have considerable powers over the destiny of their children – this is probably the worldwide consensus in all but in the most rigid and fundamentalist dictatorship regimes. Parents can determine
their children’s education, values, property, friends, clothing, etc., so for merely practical reasons „... they do and must have the liberty to make judgments about what is good for their children that not all members of the community would ratify” (Chapman, 2003, page 242) and this is okay since most of the parents work well most of the time.

Parental love is one of the dominant natural features not only of all animals but also of Homo sapiens and this biological feature still determines by far the bulk of the parental actions. How many parents are there on earth who would deny their children the best schools if they could afford it and if the children were accepted? How many parents are there who deliberately would want their children to stay inferior in the competition with other children? How many parents would like their children to be unsuccessful and unhappy? Even though this type of parent may exist and cultural values or personal problems might distort the parent’s attitude to this end, these cases are still the unnatural exception and not the rule. There are estimates that non-functioning parents account for only a fraction of one percent in stable societies (i.e. cases where alcoholism, drug abuse, or simply emotional instability lead to a behavior of neglect, domestic violence or sexual abuse towards the child) and even in case of war or some other profound catastrophe that is able to cause moral chaos only a few percent or the parents become dysfunctional. Due to the often chaotic situation in very poor developing countries the percentages of left-alone children are higher there but by and large also there the vast majority of the parents do feel responsible and take care of their children with all the means available to them.

But on the other hand, there is a wide consensus that parents also need to be controlled by the society and its institutions. They usually are „supervised” by the society they live in to some extent so that they do their job with really with the best interest of the child as the most important determinant – also this is a wide spread consensus when formulated in this abstract way and parenting is, therefore, regulated in almost all societies to a great extent: „Even in our individualist and democratic society, which cherishes autonomy and private judgment to a high degree, the education of children is compulsory until they are sixteen (although the particular character and setting of that education may be left to parental choice within wide limits). Similarly, parents must provide needed health care for their children, and even the claim of a religious privilege will not protect them from the charges of abuse or neglect should they fail to do so.” (Chapman, 2003, page 242)
It must be assumed, that the use of GEHB-technologies will probably also be regulated within this same framework of compromise between parental liberty on the one hand and supervising and enforcing minimum standards of child education by society’s agents on the other hand. There will be controversy about where exactly the right balance between those two conflicting paradigms is with general libertarians being more in favor of leaving it to the parents while general communitarians will more tend to restrict parental freedom. A fairly good impression of where the world sees the right balance between those two poles is reflected in the United Nations Convention on the Rights of Children from 1990 (that, by the way, has not been signed by the United States government yet, because the limits of parental freedom foreseen in this Convention might be in conflict with the United States Constitution).

But convinced technology-skeptics are not really happy with this, for them this prospect of some compromise is not good enough when it comes to genetic enhancement. Here again, it is McKibben who is most outspoken in this respect. Even though he admits that „... we already “engineer” our offspring in some sense: ... We’ve all seen the crazed devotion to getting kids into the right school, the right profession, and the right income brackets. Parents try to pass down their prejudices, their politics, and their attitude toward the world. ... No dictator anywhere has ever tried to rule his subjects with as much attention to detail as the average modern parent. Why not take this just one small step further? ... Most likely the answer has already occurred to you as well. Because you know plenty of people who manage to rebel successfully against whatever agenda their parents laid out for them. ... We try to shape the lives of our kids — to “improve” their lives as we would measure improvement — but our gravity is usually weak enough that kids can break out of it and when they need to.” With GEHB being in the hands of parents, McKibben warns (McKibben, 2003, pp. 57-58), the programming and the overpowering determination of children’s wants, beliefs, etc. would go too far. Parents would then hardly be able to withstand the temptation to „program” what they probably could not achieve by education to the same degree. For example, they would „...not be calling up their children on the phone at annoyingly frequent intervals to suggest that it is time to get a real job; instead they would be inserting a gene that produced a protein that would make their child behave in a certain way...” predicts McKibben (page 58).

To make his point even clearer, McKibben gives a quite disturbing example: „Scientists – ‘neuro-theologians’ someone has called them – have pinpointed the regions of the parietal lobe that quiet down when Catholic nuns
and Buddhist monks pray. Perhaps before long we will be able to amplify the reaction. As a result, the minister’s son might be even more pious than he is – but if he has any brain left to himself, he will question that piety at the deepest level, wonder constantly whether it means anything or it is so much (literally) brainwashing.” (McKibben, 2003, page 48). GEHB, this is the recurring theme in McKibben’s positions, would determine the children not only differently but also in a much more intense way and this is too much of an intervention to be still ethically okay.

This is an assumption that not all the critics of GEHB share, such as Fukuyama who writes that „... behavior affected by multiple genes ... becomes very complex and difficult to predict”, but he then goes on pointing out that parents may make problematic choices after all: „Parents may be under the sway of a contemporary fad or cultural bias or simple political correctness: one generation may prefer ultra-thin girls, or pliable boys, or children with red hair – preferences that can easily fall out of favor in the next generation.” (Fukuyama, 2002, pp. 92-93)

Of course parents are not and do not want to be unbiased as Gregory Stock points out: „People will be inclined to give their own children those skills and traits that align with their own temperaments and lifestyles. An optimist may feel so good about his opinion and energy that he wants more of it for his own child. A concert pianist may see music as so integral to life that she wants to give her daughter greater talent than her own. ...” But this, says Stock, could lead to a divisive trend of specialization within human societies after a few generations: „To the extent that enhancements of this sort by parents engender mindsets to attenuate the traits of their own children, such traits may reinforce themselves from generation to generation ... These tendencies ... could produce a relatively unaltered core population and clusters of individuals with highly specialized talents and temperaments.” (Stock, 2003, page 120)

Besides, there always is a lot of social pressure at work to make parents invest money and time into their children: Almost all societies have ideas about how to take care of the future generation and the generally perceived necessity to keeping up with the standards of the social group also adds to the pressure - the proverbial „keeping up with the Jones” would most likely also determine GEHB choices of parents if they were freely available. „Keeping up with the Jones” could also mean „our kids have to keep up with the Jones’ kids.”
As described above, the social pressure of taking care of the next generation properly has produced numerous of formalized rules such as obligatory health checks for children, the obligation to go to school for a certain number of years, the monitoring of parental minimum qualities by social workers, the providing of minimum food, clothing and housing for children of poor families, etc. Most countries on earth have some minimum requirements for the upbringing of the children born in this country that they either expect the parents to fulfill or that they help fulfilling by direct government financing or intervention. The same could theoretically become true for germ-line enhancement one day. Imagine school administrations all over the world requiring a certain level of intelligence since it is available by genetic enhancement – who could as a parent reasonably resist the application of the technology under these circumstances? Imagine genetic enhancement technologies becoming as generally acknowledged as, say, vaccinations, or as correcting the children’s teeth with braces.

But parents also have expectations about their offspring that have nothing to do with the best interest of the child. The conflicts between the desires of rebellious children and other considerations and values have provided material for countless fiction writing of many authors over many centuries (just remember Shakespeare’s Romeo and Juliet as one of the classics in this field) and of countless movies during the last 100 years. Parents want to be loved by their children, parents want their children to follow the same moral values and rules, parents want to be respected by their children and, when death comes closer and closer, parents also seek the closeness to their children. Parents want their children to be an improved copy of themselves and a continuation of what they are themselves.

In most cases it is very difficult to judge what the intention of a certain educational measure is. Most parents would probably have difficulties to differentiate themselves even if they made an honest attempt. Do parents disagree to their daughter being in love with a young rebel because they fear for their daughter or because they disapprove of the values of the young man? When parents insist on their child learning about classical music – is it because they appreciate classical music themselves or because they think classical music is good for their child? What makes the situation that parents are in so difficult by nature is the fact that children cannot really give reasonable informed consent, especially not before they are even born. Being a good parent and educating properly by definition means intervening, breaking inappropriate resistance, fostering one thing and avoiding the
other thing as a surrogate decision maker. Parenting means leadership. This is more true for younger than for older children. And it would surely also determine decisions about the question of genetic engineering, in particular when the brain of the child-to-be is the object of the enhancement project.

One could even speculate about which traits the parents would choose for themselves and if they would differ from the ones they would choose for their children and whether they would differ again from the traits that the children would choose for themselves. The answer is probably „yes“ to all of these questions. All human individuals would probably choose for themselves more emotion-related traits, features „that make you feel better,“ and this is true for the parents as well as for the children. Parents-to-be, however, might have a tendency to equip their children with traits that would enable them to compete successfully, to turn them into ambitious and focused producers and „fighters,“ all with the best intentions. This is why children quite often find out with surprise that their parents used to be wild teenagers at some point in the past, and that the parents themselves have not always obeyed the same rules that they are handing down now to their own child as binding principles for proper behavior. Another almost classical conflict would then be transferred to the level of genetic enhancement and the crucial focal point of this conflict would be most likely genetic enhancements targeting the brain of the child.

8.2.4. Old Frontlines Applied to a New Topic? Libertarian versus Communitarian Thinking

Libertarian thinking assumes that individuals might make mistakes, but so might central planners. It also assumes that to limit the freedom of an individual there has to be a very good reason. But the status quo is that parents have considerable freedom with the society having the final say and the right to intervene if children are not raised the way society deems fit. This basically communitarian point of view is described by Sondra Wheeler in a very illustrative way: „Parents who fall significantly below social standards of adequacy in the fulfillment of their parental responsibilities can have their liberty curtailed, subjecting them to monitoring and supervision by society’s agents. Continued failure to exercise parental authority in a way that provides for children’s basic welfare can lead to the court-ordered loss of custody, parental rights, and even the privilege of visitation. In short, in law
and in morality, the comprehensive liberty that parents enjoy in the care
and rearing of their children is ... also limited by the ends that relationship
is intended to serve, both for individuals and for society. When it fails to
serve or directly contravenes those ends, parental liberty can be forcibly

To illustrate the tricky ethical questions that may lie ahead of us concerning
GEHB in this context, James Hughes asks whether society should have a
right to intervene when parent couples decide in favor of some quite radical
genetic changes for their offspring, and he gives a few examples to illustrate
the difficult problem:

- What if a gay couple wants a gay child and asks for the proper GEHB
design? Or even more radical:

- “If people choose for themselves to live underwater with gills and
flippers, and then choose to have children to share their underwater
society, would this be child abuse or enhancement? It takes away
some abilities but adds others.” (Hughes, 2003, page 141).

Hughes, does not regard himself to be a libertarian, but emphasizes never-
theless that „parents deserve to exercise all the genetic choices science can
provide, and they deserve the benefit of the doubt that they will make
choices that enrich their children’s lives. Who more than the parents, who
will have to raise the child, would care more about the many tradeoffs, risks
and unknowns that will go into each decision?” (Hughes, 2004, page 134).
Hughes also insists that decisions on what he calls „germinal choice“ deci-
sions by parents should not be based on the „yuck factor“ connected to hav-
ing genetically enhanced humans around. It should not be habits or ques-
tionable definitions of what is „normal“ in looks and behavior that deter-
mine bio-politics in the future. To make his point, he reminds us that there
were grave mistakes in ethical judgment made in the past by following hab-
ts: „Having Rosa Parks sit in the white section of the bus in Montgomery,
Alabama certainly was disorienting and disturbing for many white South-
ers. The education of women was deeply troubling to many tradition-
minded men in nineteenth century Europe, as it still is in parts of the
twenty-first century Middle East.” (Hughes, 2004, page 59)

It seems, thus, that the question if, when and where the community should
intervene in case of GEHB decisions is really the classic question of parental
liberty and common values in a new outfit. It is, thus, a classic question of
politics. By formulating a variant of Harold Lasswell’s definition of „poli-
tics” (See http://en.Wikipedia.org/wiki/Politics, April 7, 2006), one could say that politics is the question „who gets to decide what, when, where, and how.“ It is, put in more pragmatic words, the question of how government interventions that restrict parental liberty concerning GEHB shall be organized in the future.

**8.3. Governing GEHB**

**8.3.1. The Relevance of Government: There is no Generally Accepted Ethical Theory on GEHB**

We have come to the final mental step that almost all of those authors who have written books about genetic enhancement have offered at the end of their work: the role of government or other institutions of society in regulating genetic enhancement and thereby in supervising parental decision-making. There are numerous articles on this topic as well and the following pages are an attempt to get an overview and draw conclusions from these published views and arguments.

In general, the role of institutionalized politics can be quite different depending on whether or not there is a general consensus on an issue in principal. If there is, then the institutions of society are implementing agents and the decisions left are experts’ matters– above I have offered the thesis that this will be the case sooner or later with pure therapeutic applications of GEHB technologies. But in more value-driven issues and when there is no consensus in very basic questions then those institutions of society are required to become active in organizing the decision-making procedure within the society. Formally seen, in democracies these are the parliaments deciding on government actions as lawmakers.

In today’s reality of mature democracies, the media also have an informal but very important factual role, as do all other institutions that have some publishing power such as academic institutions, advisory councils, representatives of professional or industry associations, etc.
In case of GEHB there is no general firm consensus on the basic paradigms in place yet, as shown in the present book up to this point. Let us summarize what has been covered so far:

- As we have seen, religions neither offer a coherent basis for decision-making on GEHB nor is religion in our world today a strong enough power to influence all of humanity. There are many religions and world views and adherents of those differing world views also arrive at differing conclusions about GEHB. There is thus a cacophony of opinions rather than a strong and harmonious chorus promoting a certain ethical view of GEHB.

- The same is true for the semi-secular basic paradigm called human dignity and human rights. Even the most basic principles of biomedical ethics are either too limited in what they cover or are not universally accepted enough once they are transformed into concrete, detailed rules. Also, using human nature as a starting point for the search of universally acceptable moral limits concerning GEHB cannot really be a fruitful approach, since it is this very human nature that could become the target of GEHB technologies once they go beyond the treatment of unquestionably harmful genetic defects.

- The respect of human nature as a result of evolution depends on the belief that evolution is a wise and targeted process of improvement and betterment. However, this belief is no longer shared by everybody of the intellectual avant-garde of the early 21st century. Many people regard evolution as a random based mechanism with no recognizable goals or ends, at least not recognizable for us humans. This „evolution skepticism“ has led to a quite critical view of Homo sapiens and his inherent value and status. It has also led to the question of why those humans who would like to take evolution into their own hands should not be allowed to do so with the „transhumanist“ movement at the forefront of those promoting the right to genetic enhancement.

- On the other hand, technology skeptics have serious arguments against letting these rights go too far. They can point to recent experiences during the 20th century such as eugenics, nuclear technologies and others, – all of which they perceive as too fast and too uncontrolled. Technology skeptics believe that these technologies have
brought deterioration rather than a betterment of the human living condition.

- These arguments pro and contra GEHB gain even more weight because we are not talking about well informed adults deciding about their own bodies and minds when discussing GEHB. Instead, we are talking about the destiny of yet unborn children who need and deserve special protection from poor judgments that their parents might potentially make. Complete parental liberty is not really an option for solving the conflict about GEHB; at least this view is probably shared by the vast majority of the world population. After all, it might not just be a few individuals but the whole future generation that is affected by GEHB if and when it becomes a generally accepted and available technology.

All in all, as a conclusion of the analysis of the relevant literature, one hypothesis for the development of an agenda for the public debate on GEHB surely has to be that there is no such thing as a generally accepted theory about the ethics of GEHB at this point in time. There is no „obvious“ set of moral rules concerning GEHB that everybody agrees on - at least not yet. While all humans would, for example, agree that killing is bad in principle and would then fight about the details and exceptions to this general rule, not even such a basic agreement is in sight today on any of the important aspects and variations of GEHB that one could think of. The range of views currently reaches from total rejection and a loud demand of a total global ban to a radically liberal demand for largely autonomous parental decision-making coupled with a demand to support the technological development and to go ahead full speed with it.

GEHB is in this respect a deeply controversial political issue, and will probably remain so for many years to come. For ethical theorists or expert commissions it is tremendously difficult to figure out what is right or wrong on the basis of generally accepted basic principles governing GEHB since those basic principles themselves are still a matter of intense discussion. Right now the battlefield is left to all of the specialized advocacy groups who spend many millions on influencing public opinion; to all the bioethics commissions to whom governments of today love to outsource the production of proposals in this tricky area; to all the advisory councils and corporate lobbyists who try to influence the politics of GEHB behind the scene.
The following subchapters try to outline the main features of the opinions and recommendations that authors who have written about genetic enhancement have given to politics on how to go about in governing GEHB in this deeply divisive environment.

8.4. Classic Approaches to Biopolitics: „Drawing Red Lines“ by Legal Restrictions to GEHB

8.4.1. Ideas about Institutions and Procedures

Classic approaches to government regulation of germline modifications usually have the technology safety as a starting point while ethical-societal governance is looked at as an „add-on.” The classic approach is usually chosen by those authors who do not indulge in far reaching visions or scenarios but in the pragmatic questions of the policy making that governments will have to cope with within the next 10 years or so. They assume that germline modifications will be a question of merely therapeutic applications and that thus what is needed is extended policies to regulate this new medical field. If at all, they mention only the possibility of further, „real“ enhancement as a policy problem on the side. The lawyer Julie Gage Palmer and the medical doctor Robert Cook-Deegan, for example, published the following recommendations:

„Our proposed regulatory approach includes the following characteristics:

- A national body should prospectively review IGM (= inheritable genetic modification) research proposals, based on considerations similar to those used by the RAC in reviewing somatic cell gene transfer protocols. These considerations include alternative treatments, potential harms and benefits, fairness in the selection of research subjects, informed consent, and privacy and confidentiality. The IGM review process should consider new issues as well, such as impact on future generations and potential social harms and benefits. …”

Palmer and Cook-Deegan also emphasize that they believe in the paramount importance of public disclosure and of a fair and well-balanced system of checks and balances: „Review of IGM research proposals should be
public and should include opportunities for public comments. ...The FDA review is conducted confidentially (but :)... For IGM research there is a strong need for open public disclosure and public input. ...The standing review body should be multidisciplinary, represent diverse interests and include nationally respected members of the ‘IGM community’ (See: Chapman, 2003, pp. 276-277)

This approach does take into account the fact that legislation and regulation concerning biomedical issues always have an ethical sideline, but it does so more theoretically than with practical suggestions.

More explicit and very comprehensive is the chapter on „The Political Control of Biotechnology“ that Fukuyama offers, who is actually a professor for international politics at Johns Hopkins University (Fukuyama, 2002, pp. 181-214). For Fukuyama those two basics are very clear:

- Control of biotechnology is a matter of politics („... the state has an obligation to intervene to protect the child“ page 187 ;)

- It is the democratic institutions of elected governments who should be in the driver’s seat: („... The answer to the question of who gets to decide on the legitimate and illegitimate uses of science is actually pretty simple...: it is the democratically instituted political community, acting chiefly through their elected representatives, that is the sovereign in these matters and has the authority and to control the pace and scope of technological development. While there are all sorts of problems with democratic institutions today, from special-interest lobbying to populist posturing, there is also no obvious better alternative ...“ page 186)

For Fukuyama it is also clear that biotechnology can be controlled. In this belief he contradicts those who regard only international regulations as effective: „No sovereign nation-state, it is said, can regulate or ban technological innovation, because the research and development will simply move to another jurisdiction. ... This kind of pessimism about the inevitability of technological advance is wrong and it could become a self-fulfilling prophecy if believed by too many people. ... There are many dangerous or ethically controversial technologies that have been subject to effective political control, including nuclear weapons and nuclear power, ballistic missiles, biological and chemical warfare agents, replacement body parts, neuropharmacological drugs, and the like, which cannot be developed or traded internationally. ... Indeed, the common assumption that it is impossible to
control pornography or political discussion on the internet is wrong. It is not possible for a government to shut down every objectionable Web site around the world, but it is possible to raise the costs of accessing them for ordinary people who live in their jurisdiction. … it proves that the march of biotechnology is not an unstoppable juggernaut. … The argument that regulation cannot work in a globalized world unless it is international in scope is true enough, but to use this fact to build a case against national level regulation is to put the cart before the horse.” (Fukuyama, 2002, pp. 188-190). This point of view clearly contradicts some of the findings of an earlier chapter where the case study of abortion was scrutinized. Also, this might be a valid perspective in a country where people travel so little outside their own nation as the citizens of the United States do and the examples chosen by Fukuyama are a list of „all the bad things of this world” and do not contain technologies that may be seen as very positive by some such as GEHB.

The enforcement discussion will always be an issue of all regulatory suggestions concerning GEHB.

### 8.4.2. The Regulation of Growth Hormones in the United States as a Case Study

In the United States ethical issues are currently and factually regulated by the FDA whenever it is necessary to make a decision on allowing a certain drug or treatment method on the market. One of these examples is that in order to determine in which cases the use of newly developed growth hormones is allowed or not, the FDA had to come up with a general definition of „normal height.” We have already seen in a previous chapter how difficult it can be to come up with a generally accepted solution and to avoid arbitrary and value-driven judgments.

The website of the Human Growth Foundation (http://www.hgfound.org/ April 07th, 2006) reports on the admission of the new drug rGH the following way: „On July 26, 2003, the federal Food and Drug Administration approved a supplemental new drug application by Eli Lilly & Company for the use of human growth hormone to treat children who are healthy but unusually short (defined as an adult height of less than 5 feet 3 inches for men and 4 feet 11 inches for women) without a known cause. This approval makes rGH available to short children who may suffer from, but cannot demonstrate, a
medical condition that is responsible for short stature. The FDA based its decision on studies that found the biosynthesized hormone Humatrope added between one and three inches in height to children who took it for four to six years, and that there were no significant health risks for the children. The FDA decision followed the recommendation of an advisory panel last month that voted 8 to 2 in favor of approving the new usage of the drug. The approval could significantly increase the number of children who receive rGH, which can cost $30,000 to $40,000 a year. The effect of the expanded use of rGH on its cost to patients and on insurance coverage is not yet clear. The medical profession is split on this expansion of the use of rGH. Critics argue that the expanded use of rGH is likely to be misused for non-health reasons."

Transhumanist James Hughes criticizes this decision as too restrictive and suggests a more liberal adaptation: „A policy permitting height enhancement for the shortest 10-20% would still, however, be far more generous than the U.S. Food and Drug Administration restriction that human growth hormones only be prescribable for the shortest 1% of children.” (Hughes, 2004, page 238)

Needless to say, there are powerful interests involved in such a discussion as well, as the following quote from the website http://www.hgfound.org/ of April 07th, 2006 shows: „Pfizer has announced in the June 2003 issue of Pediatrics, the official journal of the American Academy of Pediatrics, the publication of an international consensus statement on the treatment and management of persistent short stature in children born small for gestational age (SGA) who do not exhibit catch-up growth by age two. According to the consensus statement, SGA is defined as babies with a birth weight or length or both at least 2 standard deviations (SD) below the mean for their gestational age, which translates to below the third percentile on most growth charts. In full-term babies, this roughly estimates to less than 5 lbs 6 ounces and/or 18 inches long. Accurate gestational dating and measurement of birth weight and length are important to identify children with the condition. The consensus statement endorses the use of growth hormone therapy to normalize height of children born SGA who do not manifest catch-up growth by age two. There is long-term experience with growth hormone doses ranging from 0.24 to 0.48 mg/kg/wk (milligrams per kilogram per week). However the higher dose is more effective in terms of short-term growth, which is why the consensus statement suggests a starting dose at 0.48 mg/kg/wk to achieve rapid catch-up growth. In the United
States, an estimated 91,000 infants are born SGA every year. While the majority of these children manifest spontaneous catch-up growth by age two, approximately 10 percent do not. It is this group of SGA children that are considered to have persistent short stature or SGA without catch-up growth. These children are at risk for short stature throughout their lives and therefore should be referred to a pediatric endocrinologist or pediatric growth specialist for evaluation.

The consensus statement was issued by a 13-member international advisory board of leading endocrinologists and pediatric growth specialists through an unrestricted educational grant from Pharmacia Corporation, a wholly-owned subsidiary of Pfizer.”

Such detailed, careful procedures like these regarding something as harmless as being a little too short give a little glimpse of the intense discussions and power plays that will come when GEHB technologies for increasing intelligence or for personality traits are up for market admission.

8.4.3. The Regulation of Genetic Screening in Great Britain as a Case Study

The presence of high level regulating power does not necessarily mean that there will also be a high level of rules and regulations or that the consequence will always be a restrictive attitude towards genetics applied to humans. For example, the only country that presently has a separate government authority for regulating issues of reproduction technologies is Great Britain with its „Human Fertilization and Embryology Authority” (HFEA). The HFEA is the UK statutory body which regulates, licenses, and collects data on fertility treatment, IVF and donor insemination, as well as human embryo research in the UK. To the dismay of religious and secular opponents of genetic screening in 2003 the HFEA gave general permission for unspecific genetic screening, i.e., even when there is no specific indication that an embryo might be affected by a certain genetic disease – after the British government’s „Human Genetics Commission” had prepared a report with an according recommendation. The legislation on genetic screening that resulted from this recommendation is currently considered one of the most liberal ones worldwide amongst those nations that have an explicit regulation on this issue at all. In other words: content decisions on GEHB
will most likely not be determined by the kind of institution that a society decides to establish for this political issue, it will remain a pure content decision with all the values and arguments coming into play that were portrayed throughout this book thus far.

8.4.4. The Differentiated Governmental Action Approach of James Hughes

The classic approach of only regulating safety of technology is also favored by transhumanist James Hughes, who argues that only those complicated questions of technology safety need the input of government experts acting as regulators while ethical questions should be left to parents to a great extent. However, Hughes derives his ideas of whether genetic enhancement should be *legally* regulated or not from a quite differentiated picture of modern government that is far beyond the simple question of what should be allowed and what should be banned. His „List of Options for Regulating Technologies in a Liberal Democracy“ shows that everyday policy-making is far from being simply black and white, instead there are many shades of grey in between (Hughes, 2004, page 239):

„**Mandatory, no exceptions** e.g., emissions controls on cars, and quarantine of dangerous infections;

**Required, but with religious exemptions**, e.g., the military draft, vaccinations;

**Publicly funded and encouraged, but not obligatory**, e.g., public school;

**Encouraged, but unsubsidized**, e.g., exercise;

**Publicly funded, but not encouraged**, e.g., birth control or? abortion in some states;

**Available unsubsidized on the market**, e.g., over-the-counter drugs;

**Available but controlled by prescription**, e.g. Prozac, Ritalin, etc.;

**Discouraged by taxation and education but not banned**, e.g. smoking;

**Banned**, e.g. illegal drugs, some weapons, dangerous toxins.”

Hughes is more concerned with criteria to determine government funding for genetic enhancement than with prohibiting it or not. He also assumes
that some kinds of genetic enhancements are pretty certain candidates for making them obligatory. He suggests that a legal regulatory authority is not necessary because there are other, more subtle ways of government intervention: „...as with smoking and other social vices ... society need not remain neutral toward bad choices just because it permits us the freedom to make them...” (Hughes, 2004, page 238).

8.4.5. Non-governmental Approaches of Keeping GEHB Technologies under Control

While most of the political power in a well functioning society is concentrated in the hands of the government, politics is not necessarily based on government regulation alone. While the conventional definitions of „politics” revolve around the legitimacy and formation of governmental power, more widened views of politics are based on the belief that the ultimate power is the ability to convince a great number of individuals and, thus, is a question of creating communication impacts that can influence collective decision-making. At least in democratic societies there is a lot of plausibility to this view, for example when the media are labeled the „fourth element of checks and balances” next to the legislative, executive and judicative institutions.

Some say that this kind of politics – the politics of convincing by intense communication rather than by laws and regulations – will be the only chance we will have to keep GEHB under control in the long run. In a world populated by more than 6 billion human beings living in some 200 sovereign nations it is a complete illusion to attempt a compulsory regulation for everybody everywhere of something as private and discrete as human reproduction. It would take a total surveillance regime as described in Orwell’s 1984 to be effective as a government then and besides, it would take the establishment of an effective world government first. Neither of these may be desirable, let alone realistic.

Thus, the argument goes, the most effective form of politics in general and when concerning reproduction technologies in particular, is not the type of government that we know from an extended „clan” where a leader or a team of leaders determine the direction. Rather it is the politics of a swarm where all group members follow the movements of their respective
neighbors. Only the few individuals on the edges react to factors outside the swarm, such as in the recent rebellious actions in Venezuela, Ukraine and France. A few organizers informed others by cell phone about protest actions planned shortly before they were scheduled and then counted on the chaotic dynamics of a snowball information system that proved to be very effective. Other examples of cases where transnational „swarming” happened include crazes about movie or pop stars appearing in public somewhere, to global soccer events to the global ecologist movement or to terrorist action of independent Islamic fundamentalist groups. These movements all show that humans may behave very similar to swarms when pushed in the right way, at the right time by a few activists who are able to communicate to a large number of people effectively.

McKibben counts on this power of conviction. He admits that the powerful attraction and the power of economic interests might drive the technological development towards a wide spread of use genetic enhancement but even though these powers exist, they do not make the development inevitable and certain: „Our success with prohibitions is mixed at best. Americans drank through the 1920s and they smoke dope today. Economic sanctions often leak. Commercial pressures often trump wise policy making. And so on. But these are arguments not proofs – they don’t guarantee that widespread use of these technologies is inevitable, merely that it is likely. ‘Likely’ is a long leap from ‘certain.’ In fact there are three examples from the present and the past to hearten us. We’ll begin with three very different cases from around the world. …”. McKibben then describes three historic examples as model cases for how to deal with genetic enhancement in the future: a) the rejection of most modern technology by the Amish of today; b) the 15th century decision of China to scrap its fleet because it did not want to conquer the world even though it could have; and c) the decision of the Tokugawa shogunate in the 16th century Japan to abolished firearms. McKibben realizes that he will have to face the claim of being naïve and responds to it preemptively: „I am well aware that these cases don’t prove that we will be able to hold human genetic engineering and aggressive nanotechnology in check. They come from other ages and other cultures: they were confined to one society; they occurred under authoritarian rule; and they eventually gave way before the force of competition from abroad. They do, however demonstrate one thing. In Perrin’s words, we sometimes think of ‘progress’ as something semi-divine, an inexorable force outside human
control. And, of course, it isn’t. It is something we can guide and direct and even stop.” (McKibben, 2003, page 173)

This view of thing regarding the political control of GEHB is very similar to what Joel Garreau regards as the most basic „key elements” of his „Prevail” scenario that constitutes a kind if synthesis between the „heaven scenario” and the „hell scenario” that he presents in his book Radical Evolution:

„Humans have an uncanny history of muddling through – of forging unlikely paths to improbable futures in defiance of historical forces that seem certain and inevitable. … The wellspring of muddling through, of this prevailing, is the ability of ordinary people facing overwhelming odds to rise to the occasion because it is the right thing – for example, the British ‘nation of shopkeepers’ defied the Third Reich. … The key measure of Prevail’s success is an increasing intensity of links between humans … In Prevail, humans are picking and choosing their futures in an effective manner. They are actually succeeding in practical ways to slow change that is seen as negative or accelerate change that is seen as positive.” (Garreau, 2005, pp. 224-225)

This book very much promotes the thought of swarming societies as a new form of democratic decision-making. I believe that in the end democracy will not have a realistic chance of surviving unless the participants, i.e., the society members in their various roles as voters, citizens, consumers, etc., act as qualified and willing members of a swarm, whereby everybody takes part in leadership without a real leader directing the crowd. But we will discuss more about democracy in high tech societies later after having investigated some more what various authors think about the way governments should act on genetic enhancement.

8.4.6. Gregory Stock’s Casuistic Approach: „Take Things as they Come, one Step at a Time”

Not only the question „ban or no ban” is inherently wrong due to the fact that there are many shades in between. The fact that there are a great number of potential GEHB applications and perhaps numerous unforeseeable turns of the future technological development of GEHB also necessitates the refinement and differentiation of future policy making. As we have seen, GEHB is really a classification for a wide range of very different technologi-
cal interventions rather than an exactly defined application itself. Whether the Huntington gene is modified or whether the mechanisms for serotonin reuptake are changed makes a big difference for the way society will make the relevant ethical and policy decisions on these two interventions, even though the basic bioengineering work might be very similar in both cases. So this technology aspect definitely adds to the complexity of the political process on coming to ethical conclusions on GEHB.

The exact development of GEHB technologies also plays a role in determining the moral rules with which to govern those technologies. For example, it makes a huge difference whether artificial chromosomes really will allow the insertion of genes into the body of an embryo that can be switched on or off by the adult individual later or whether this particular technological element will not be available. It would also create a completely different situation if artificial wombs were available: If so, it could also be a single individual producing a clone of him-/herself without even having to consult a partner about the traits of the child; a mass production of a theoretically unlimited number of such clones would theoretically then be possible with all the implications that this would have, while a traditional couple with the dependence on the one female womb would never be able to produce thousands of children even if they wanted to.

GEHB regulation would probably have to be very different depending on what technology forecast scenarios one decides to follow.

This very fact of yet unforeseeable technological developments made Gregory Stock suggest that we should take things as they come without panicking or overreacting. In the appendix to his book „Redesigning Humans“ (2002, pp. 205–209) which is entitled „Regulatory Paths in the Era of Germinal Choice“ he writes:

„Here are a few suggestions for minimizing the conflicts to come:

- We should deal with actual rather than imagined problems. If we write pre-emptive regulations based on vague fears rather than real occurrences, many benefits will pass us by. Coming up with utopian and dystopian scenarios is easy, but they tell us more about their author’s hopes and fears than about what the future will bring

- The challenges facing us do not pose a choice between right and wrong but a need to mediate between right and right. Given the rapidly changing technological landscape, the uncertainties about the nature of the possibilities before us, the ill-defined and changing risks of
various procedures, and yet unknown ways that people will try to use these emerging technologies, we need to retain the capacity for modifying our approaches. This suggests that we should avoid sweeping legislative responses that are difficult to amend, rely as much as possible on narrow administrative guidelines that can be adjusted in response to new information, and use case law to deal with the individual conflicts that arise from early implementation of CGT (Author's note: CGT = „Germinal Choice Technologies”, a term that Gregory Stock introduces in the beginning of his 2002 book). Only when a real and pressing need exists should we resort to more extreme legal and legislative tools.”

Gregory Stock’s suggestion of a deliberate muddling through-approach to the bio-politics of genetic enhancement seems very logical and plausible at first sight. It does make perfect sense to regulate the details of a technology application on a case to case basis – in reality there is no other way of doing this anyway when it comes to the detailed rules, since modern technologies constantly keep changing their faces and politics then has to react to this.

But I still think that it does make sense to discuss the basic principles already that should govern policy-making concerning GEHB. The arguments for this opinion are contained in Stock’s book itself. For Stock the area of germ-line modification in humans is dominated by three domains of interests:

- The interests of the society at large
- The interests of parents
- The interests of the future children.

These interests could be conflicting in certain cases but they could also be simultaneous and conflict-free in others. In any case these are classic areas of politics and a lot of the discussion can be based on already existing principles and rules. We need only think about whether they might be applicable to GEHB.

One of the reasons for Stock’s suggestion might be that he is very suspicious against an overly strong emphasis on the interests of society at large. Indeed, he has good arguments to support this suspicion:

„A bias toward societal interests, by its very nature, can bring the most widespread abuses of individual rights. ... Whether such programs intend to improve population’s genes, reduce the number of disabled who might burden public resources, or alter reproductive patterns in various socioeco-
nomic or ethnic groups, they are all essentially efforts to influence the constitution of the next generation in a supposedly desirable way by controlling individual reproductive behavior. Those policies come in many forms, because the political and moral philosophies that shape them can be so different. As the potency of GCT (= Germinal Choice Technologies) increases, this realm will need to be watched vigilantly, because it can be fertile soil for grand social experiments. Our newfound powers in human reproduction will make such efforts tempting, but we have the lessons of history to remind us how easily even the most innocuous family-planning program can mutate into malignant forms.” (Stock, 2002, page 206)

On the other hand, Stock is also fully aware of the difficulties of assessing the interest of future children. Basically, it comes down to judging what a good life is since otherwise the limits of parental liberty cannot be determined: „Parental use of GCT (Germinal Choice Technologies) will influence future children in ways that are difficult if not impossible to gauge in advance. Critics of human cloning in the United States, for example, frequently assert that being a clone would damage a child psychologically, and that therefore the practice, even if it were medically safe, should be illegal. This argument is unconvincing, given that identical twins do quite well. …

Clashes arising between the desires of prospective parents and the interests of their children will likely bring the most legitimate and thorny problems for future regulation, and the area warrants caution. …To put much faith in questionable projections of the imagined happiness of hypothetical children will not provide much useful guidance.” (Stock, 2002, pp. 206-207)

Most authors agree in vague terms that the broad public has to be included in the discussion about genetic enhancement at least concerning the ethical principles that are to be applied. But so far a broad public debate is not really taking place. Rather than being public the real content-rich discussions take place behind closed doors amongst experts, while the general public is mainly targeted with the tainted and watery information issued by advocacy groups. This could be a great problem depending on what kind of democracy one prefers.
9. **THE IMPORTANCE AND THE STRUCTURE OF A STANDARD AGENDA TO DISCUSS GEHB**

9.1. **Challenges to Be Met**

9.1.1. „Technological Wisdom“ as an Ambitious Goal

One day my four-year-old daughter saw that I was just about to get our largest glass bowl down from the upper-most shelf of the kitchen cabinet. Immediately and without the slightest hesitation she shouted: „Daddy let me do that. I can help you and I can do it all alone!“ Of course, my wife and I talked her out of climbing up a ladder that is twice as tall as she is to pull a heavy and fragile glass object off of the shelf. It is part of the art of parenting to do this without causing too much frustration for the eager child.

What seems like a cute story from family life and a harmless example of common-sense-parents' intuition is in reality an example for a very important philosophical observation that is highly relevant to ethical positions concerning GEHB. Examples like this one show that human beings are probably not born to be modest, humble and self-knowing. Quite the contrary, for humans it takes a lot of deliberate effort to achieve self-knowledge. This, in turn, makes the ancient fear of „hubris“ – the apocalypse following an act of human over self-confidence – a very real danger.

According to the Wikipedia Website of December 2006, the definition of „hubris“ is: „In its modern usage, hubris denotes overconfident pride and arrogance; it is often associated with a lack of knowledge, interest in, and exploration of history, combined with a lack of humility. An accusation of hubris often implies that suffering or punishment will follow, ... „pride goes before a fall“ is thought to sum up the modern definition of hubris.”

In the context of this book, this philosophical observation mainly means that humans should not be too fast to jump into acts of ill-considered use of this
new and complex technology that could potentially have such a profound impact on the human living conditions in the future.
In previous chapters I claimed that it is not realistic to expect a total ban of all research that might lead to GEHB technologies to hold forever, even though this is exactly what large parts of the Judeo-Muslim-Christian clergy and large parts of the current political establishment in some countries like Germany demand today. It is unrealistic because genetic enhancements could theoretically happen in the private secrecy of the parent-geneticist relationship and cannot easily be controlled on a global level due to the easy availability of international information and international travel.

Besides, GEHB also could bring an improvement of the human living conditions, just like many other technologies did, especially when it is used for „healing” an unbearable situation. Radical technology negativism is a minority point of view and will remain apart from the mainstream as long as technologies provide comfort, luxury and fun to a greater extent than they bring danger, death and depression. But the fact also remains that both are possible – an improvement and a deterioration of human living conditions resulting from technology and its general use.

It follows that what we need most is widespread wisdom in order to assure that as many parents as possible are kept from making poorly considered moves within the realm of their decision-making powers. In case of real genetic enhancement it will not merely be a medical doctor suggesting a therapy; it will most likely be the parents who pick some genetic intervention based on what they want, what they believe and what they know. So it is not only informed consent what our goal should be here, but instead it is more than that and I would like to call it „informed genetic decisions.”

This is where politicians, scientists, medical consultants, maybe social workers or family consultants – in brief: the whole social system surrounding and supporting the parents and influencing them directly or indirectly in their decision-making – will all have to find their respective role as well. In most cases it will most likely be a role that all these parties have to be prepared and trained for.

Most authors investigated for this book agree that it is probably not advisable to jump ahead full speed, completely relying on the wisdom of parents and of their individual advisors without preparing them for this difficult decision-making, an idea likely to be supported only by the most radical libertarians. We can assume that there will probably be a broad public
agreement that GEHB needs some kind of regulation and that there should be some limits to the parents’ freedom. But we can also assume that there will have to be intense public discussion over a longer period of time to arrive at a well-considered set of laws and regulations and to well-considered moral rules that people are really happy with and are voluntarily willing to comply to. What makes this discussion particularly difficult is the fact that GEHB is a complex technology. As mentioned above several times, it is one technology from a purely technical point of view, but it might be used in a very broad variety of applications with very diverse consequences on a political, societal and psychological level. It is a technology that works very indirectly by modifying genes that influence the brain structure that influences feelings and thoughts but that is not the only and exclusive way of influencing the brain. In other words: this will not be easily understood material for most parents-to-be. I dared make the bold prediction that societies around the globe will sooner or later accept germline modifications that are clearly used with a therapeutic intention, but that those applications of GEHB technologies that are used for pure enhancement will remain controversial. Whether a specific GEHB intervention shall be classified as therapy or enhancement will probably be also controversial in numerous ways in the future. There will probably be ample grey areas just as it is the case now with many of the modern psychotropic drugs. Thankfully, there is still some time available for this discussion for the mere practical reason that the first case of GEHB has not even happened yet and it is probably not to be expected within the next few years. Even once it has happened, most likely in the form of a germline modification to cure one of the well-researched and single-gene brain diseases, the development of more sophisticated and more controversial interventions will probably still take at least one or two decades in a process of slow, step-by-step scientific progression. And yet, wisdom in the political arena and democratic regulation of complex technologies like GEHB does not just come by itself. Something needs to be done in order to achieve it. In particular, something needs to be done to inform the general public in such a way that as many people as possible are enabled to come up with a qualified and well-grounded decision on GEHB for themselves first. After all, in a democratic system the quality of policy decisions depends mostly on the capabilities of the participants to come up with a sound judgment.
The main challenges lie in the complications which democratic processes have to face in general in modern technological societies today. Therefore it is unfortunately necessary to venture into the wide area of theories concerning democratic decision-making of modern highly technological societies at this point even though this is a book on the ethics of GEHB and not on political processes. I will limit myself to just a few statements on issues that seem so relevant for this book that they must be addressed.

9.1.2. A Statement against Technocratic Politics

„Doesn’t it really take hundreds or maybe thousands of hours to fully grasp the whole range of complexity and sophistication of all the arguments related to GEHB? Doesn’t it take well and adequately trained academics to handle those complicated networks of arguments and facts? Doesn’t it take much more time, even to simply grasp the arguments, than whatever may be available to the average citizen? And even more difficult still to take those arguments and facts fully into account and build a mature and highly qualified opinion sufficient for designing rules and regulations for GEHB? Wouldn’t it, thus, be wiser to leave the discussion on regulating GEHB to „experts“ – i.e., those people who have a stable source of income from somewhere that allows them to spend the necessary time and effort for learning about GEHB and its ethical aspects?"

These questions reflect the attitudes of somebody favoring an „expertocracy“ style government. It is admittedly a very tempting and convenient approach to governing modern high tech societies. To opt against such an approach only makes sense when has a certain degree of distrust of any kind of concentration of knowledge and power. Maybe it even requires a certain distrust in the whole democratic systems of large Western nations as they have developed in the historic reality of the last century or so. I admit that for me this is the case. My distrust is one of the factors that inspired me to make the effort to develop an easy-to-handle, well-structured agenda for the discussion of GEHB.

My distrust is fueled by the way members of parliaments are selected (by political parties, for example), „marketed” to the voters and how votes are „acquired” and then, as a consequence, also by how those representatives select the experts that prepare and in often predetermine political decisions. In his 2005 book „Höhenrausch – Die wirklichkeitsleere Welt der Politiker”
(High on power – the unreal world of politicians translation by Christian Gruenler”) author Jürgen Leinemann portrays political power as a drug for those who have it or want to have it. He claims that it changes personalities and, like real drugs, causes a loss of sense of reality. Politicians affected by this addiction pursue constant recognition for and confirmation of the importance of their own ego. It might well be that these power-junkies are so busy keeping and enlarging their power that experts can act in the background without sufficient control, which can easily lead to decision-making processes that lack transparency. It would be naïve to assume that those experts do their work solely with the goal in mind to serve the interests of the majority of the population, thereby completely abstaining from pursuing their own values, economic or power interests. Government experts quite frequently also work in committees where specific group dynamics influence decision-making processes in with political deals along the lines of „if you support my pet project I will support yours.”

Even the very nomination process of expert teams is a potential cause for being suspicious about the dynamics at work in the background. In a 2004 article Bernd Krippner and Arnd Pollmann of the University of Potsdam scrutinized the legitimacy of and the rationale for selecting members of bioethics commissions and came to a quite sobering result. Instead of qualifications concerning the issues to be discussed, the general power of an organization or the general image of a person was more the dominant selection criteria. For example, it is hard to understand why trade unions and employers’ associations should be represented in many bioethics committees.

9.1.3. General Problems of Democracy in High Tech Societies

The discussion about how to make decisions on GEHB basically will encounter the same difficulties and potential democratic deficits that were already described in the Lippmann-Dewey debate in the 1920s. While the journalist Walter Lippman argued more in favor of the efficiency of know-how elites in government institutions, the philosopher John Dewey was more a proponent of radical democracy. Both agreed, though, that the conditions that made Rousseau and Jefferson present their community model in which political decisions evolve in a grassroots approach to democracy just does not exist any more in large and technological societies. Both also agreed that modern government institutions show democratic deficits in many respects, but Lippman was somewhat more pessimistic concerning
the alternative of letting the „public” decide since he thought it would be too difficult to equip the public with the necessary tools: „There is no prospect, in any time that we can conceive, that the whole invisible environment will be so clear to all men that they will spontaneously arrive at sound public opinions on the whole business of government.” (Walter Lippmann, Public Opinion, 1922, page 197).

Even though we all know what Lippmann means, there is a more differentiated approach to tackling the problem he addresses than establishing expert commissions. People who do not care to invest a minimum amount of effort and time in order to learn and participate in qualified decision-making should not be forced to do so. In a truly liberal and democratic society this is not always possible anyway. Freedom also must mean the freedom to abstain from politics and not participate in political decision-making. But on the other hand, those who do care to participate and want to do so by struggling for the best possible decision should get the opportunity to form their opinion in an environment that is inimical to propaganda and filled with inspiring intellectual quality.

This view is in line with a principle put forward by David Held and Jürgen Habermas that all those affected by an issue and all those who must bear the consequences of a given affair have the right to be involved in the decision-making concerning it.

In her Ph.D. thesis on „Democratic Deficits after the Displacement of Politics,” Noortje Marres quotes the Dutchman Mark Bovens as distinguishing „six displacements of politics that have occurred in recent years: internationalization, regionalization, bureaucratization, technologization, individualization, and juridization.” (Marres, 2005, page 69).

At least four of these six are highly relevant for the topic of GEHB:

- Internationalization: GEHB research and application of it is not easily limited to national boundaries. Therefore its regulation has become a topic of international bodies like the European Council or UNESCO that typically do not have a direct democratic legitimacy since the political actors in those bodies are not elected by the people but nominated by national governments.

- Bureaucratization: This is the „expertocracy” – concern as just described above.

- Technologization: Technology changes societies, argues Marres, and it „the political effects produced by techno-scientific interventions, from the development of vaccines to the marketing of genetic screen-
ing tests ... only become visible as such well after these interventions have been made.”

- Individualization: In the case of GEHB technologies, for example, the issue at question is the role of the parents and their autonomy. Parents would go unchecked unless they are controlled by written and unwritten rules that have to be decided upon in a political decision-making process—see above the chapter on bio-politics.

Marres also points out that on the one hand, these displacements carry an inherent danger: “In each of these cases, the displacement of politics beyond established democratic arrangements grounded in the nation-state yields a politics marked by a lack: lack of legitimacy, lack of accountability, and/or lack of control.” (Marres, 2005, page 10).

For example, the influence that large advocacy groups have gained could well be seen from this perspective. What this means, for example, for GEHB in an ideal world is that the necessary educational process should not be left to advocacy groups of one kind or another, as tempting as this may be. What people in democratic societies deserve is not propaganda but information. Conflicting propaganda from two or more sides still remains low-quality information. What would really be needed instead is good, high-quality information provided as an honest attempt to provide a complete unbiased picture that is multifaceted as possible.

On the other hand, Marres argues, it is not sure at all how to define „democratic deficit“ and whether democracy must always entail decision-making of a majority of the complete population. Here she points to that argument put forth by Held and Habermas that „each process affects a different community of actors, and, accordingly, for each process the political community must be demarcated differently. ... the inclusion of such varying communities in politics may require multiple democratic public for its suitable enactment. ... With the aid of this principle for the demarcation of the democratic community, the set of actors implicated in an issue, and, thus the actors to be implicated in decision-making, can be neatly disentangled from those that are not ‘sufficiently’ affected.“ (Marres, 2005, page 14 and 15).

This view of Held and Habermas would in the case of GEHB include at least all actual and potential parents which would mean almost everybody in society, except those too old to have children. Maybe one could even argue that it has to be absolutely everybody since the development of our offspring affect us in so many ways that it is hard to tell who could be legitimately left out from the decision-making.
This, however, means that almost everybody has an inherent interest in everybody else being a well informed participant of the decision-making process on GEHB. This brings us back to the design of the intended agenda for this discussion: it has to be such that all adults have a realistic chance to participate.
This must be our goal, even if only the final one, and even if it is admittedly an ambitious one.

9.1.4. Agenda Setting

The only way to pull a decision-making process out of the dark mechanics of modern policy-making is to push it into the bright daylight of the public interest and treat it there in a rational way. Once a large number of people take interest in a topic, the dynamics of political decision-making often change completely. This happens simply because elected representatives and their expert advisers as well as the experts in committees then have to explain their reasoning to an interested public, whose agreement is needed in democratic systems.
Is this possible in the case of complicated technologies like GEHB? What should the role of experts (the source of information), of the media (the information channels) and of the general public (the recipients of the information) be? How should their interaction be organized and what is feasible and what is unrealistic in this respect?
Who or what is responsible for designing the agenda on the discussion on GEHB?
The term „Agenda” means literally „to be done” in Latin. Unfortunately modern political language quite often uses the term „agenda” in this literal way by assuming that it is already clear what needs to be done and implementation can be started right away. Think of the „Agenda21” for example (what was that? I must have been breastfeeding, missed it…). There are political agendas handed out by governments for preventing the climate change, fighting poverty, or renovating a health care system, for example, that sometimes face fierce opposition because they are ready-made action plans. This is unfortunate because this can easily cause considerable confusion between this kind of definition of „agenda” and the other definition of „agenda,” which actually means „the list of points to be discussed.” All meetings that we go to as professionals all the time have agendas in that sense, for example.
Another piece of confusion is possible and worth mentioning at this point. It relates to the term „agenda setting.” In particular in the sociological communication theories, „agenda setting” is a rather fixed term developed in the 1970s and 1980s and meant the setting of priorities in the political life by the mass media. The Wikipedia-online encyclopedia explains: „According to the agenda-setting theory, propounded by Maxwell McCombs and Donald Shaw in the 1970s, mass media set the agenda for public opinion by highlighting certain issues. Studying the way political campaigns were covered in the media, Shaw and McCombs found the main effect of news media to be agenda-setting, telling people not what to think, but what to think about. Agenda setting is usually referred to as a function of mass media and not a theory.”


The theories on agenda setting evolved out of theories about issue politics that political scientists and sociologists like Elmer Schattschneider, Hugh Heclo and Steven Lukes started developing in the 1960s. They all considered issue politics and agenda-setting to be a problem for a strong democracy, since they observed empirically that they take place either without elected institutions or within those institutions, but in any case remote from the people. They observed that a discrepancy between decision makers and those affected by political decisions had developed and regarded this as incompatible with the ideals of democracy - a situation which had to be remedied, in their opinion

Modern sociological observers of the early 21st century seem to have a much more pragmatic view. At least for Prof. Renate Köcher of the Institute for Opinion Polls in Allensbach, Germany, this seems to be the case. In her 2006 article entitled „Ein schwieriger Dialog” (A Difficult Dialogue) she points out that all the players contribute - involuntarily – to the rather unqualified way in which political decisions on technology issues are made. This is the situation according to Renate Köcher:

**The Media**

Public information is collected, packaged and communicated nowadays by largely commercialized media companies who do not have the resources and the motivation to do thorough research on complicated matters, to find out who are the best experts with the most convincing arguments, to have
longer shows that have to be financed by sponsors and by advertising. In a time of „infotainment”, fast news and a limited lifespan of just any given media topic it is increasingly difficult for the media to take the role of a transmitter of well balanced and well researched facts that are needed for decision-making.

The General Audience

Is entangled in busy lives and is increasingly pampered by the omnipresence of information in the Internet. Why learn and study something when you can just Google it when you need it? This possibility of the „just-in-time delivery of information” keeps especially the younger generation from mentally dealing with topics of long term relevance – most topics of technology assessment fall into that category. Besides, there is a large portion of the population which deliberately resists letting facts and figures dominate the discussion on controversial political issues. Renate Köcher quotes a test that the Allensbach Opinion Poll Institute that she is working for has performed on a regular basis since the mid-1990s: A random selection of people were invited to observe a panel discussion on a few controversial issues such as genetics. Right when a scientist on the panel presents a set of facts, a person who has been placed in the audience by the researchers jumps up and shouts: „What do I care about all these facts and figures!? How can you talk about such a topic so coldly at all?” While 10 years ago 51% of the audience agreed with the person shouting, the most recent such experiment showed that only 39% of the people agreed. It seems, Prof. Köcher suspects, that „normal” people react to a flood of information that they cannot possibly consume and digest properly with the only strategy that seems rational from their point of view: by simplifying and selecting information in a radical way while at the same time closing down the entry ports for the information that cannot be processed by the inner systems. To put it in the words of Köcher (translation by Christian Gruenler): „The coolness of science, in particular the obligation to distinguish between secured and not secured knowledge is incompatible with the dynamics of a heated public discussion.”

The Experts

So far scientists of almost all academic faculties receive this reaction of the general audience and the laws of the modern commercialized media with a mixture of disgust and helplessness. For people who are trained to handle
lots of information mentally and who are proud and trained to focus on rational decision-making, it is incomprehensible that an audience is not even interested in „real information“ and in weighing and pondering different possibilities, let alone being able to come up with qualified conclusions by themselves. The reaction of most experts is – depending on the personality of the individual expert – indignation, arrogance or frustration. Only in very rare cases an expert is willing to go through the pain of understanding the horizon of the general audience and of learning their language, and if so, then mostly in order to pursue a political career.

The consequence of this „difficult dialogue,“ of these enormous communications barriers is dismal. Surveys testing the knowledge of the general population concerning technological topics show a shockingly low level even in those cases where a certain topic has been in the evening news for several weeks, such as in the case of mad cow disease or for several years, such as in the case of nuclear energy.

9.1.5. What Can Be Done?

The magnitude of the task to create wisdom in hundreds of millions, maybe even billions of people to assure that decisions on genetic enhancement are made by the parents, voters, scientists and citizens of the future in a deliberate, well considered and well informed way seems overwhelming at first sight. How should it be possible at all to counteract „megatrends“ like the ones outlined above with commercial media pulling out of educating the public and with the public being more and more overburdened with difficult issues and complex information?

There is a Chinese saying stating that even a journey of a thousand miles begins with one step (Confucius). It is the spirit of this saying that has to drive the efforts to counteract the potential loss of wisdom or rather to drive the effort to increase the level of wisdom at least as fast as the technological options.

More concretely, this means that an education program has to be designed that targets in principle the population as a whole and triggers „qualified intellectual gossip“ as a starting point for the creation of technological wisdom. Since resources are usually scarce, choices will have to be made on which subgroup of the society to focus on. My suggestion would be to start
with the younger people, starting at age 20, going up to age 30, since these are the parents of the near future. These are the ones who will be increasingly confronted with bioethical decisions in their very private lives. My suggestion would also be to have another focus on the intellectual and scientific elite, to target people first who have some kind of university education or who are currently studying at university.

Like in any education program, what is needed first is a curriculum, in this case a curriculum to train people in coping with the questions of genetic enhancement of the human brain. The structured overview presented in the next section is, therefore, not only an outflow and summary of all the previous chapters of this book, it is also an attempt to provide the raw material for such a standard curriculum.

Certainly there will have to be adaptations to be made depending on whether a group of 20 year old college kids or a group of Ph.D. candidates in neurobiology is the audience in a specific case. Nevertheless, a general standard agenda is definitely possible.

What can be found on the following pages is based on the status of the technological knowledge and philosophical thought of the year 2007. It is a qualified starting point and a base for further development.

The material is based on the assumption that for the topic of GEHB there is no more time available than some 10 - 12 hours, including preparation time. There are many, many other topics to be covered that are all equally important. One should be realistic in this respect. On the other hand, there should be a certain minimum of hours available because otherwise the application of this standard curriculum could also lead to more confusion instead of more clarity.

The standard curriculum also foresees an interactive and active part where participants make an attempt to design ethical rules by themselves. Empirical tests that I conducted in 2006 and 2007 have shown that the results are not always as elaborate as one might expect as a workshop organizer. One should be very realistic in this respect as well. In order to get to productive results in experiments with policy making, the workshop participants either have to have an appropriate education and mindset before the workshop even starts, enough time to obtain this education, or both.

One example where a lot of time input has led to quite qualified results even on a multinational level is the „Meeting of Minds – European Citizen’s Deliberation on Brain Science“ project that was initiated by the King Bau-
douin Foundation. The project included 8 meetings that required a total input of some 15 days in conferences. In addition to that travel time, significant time for reading, phone calls, informal contacts and other „homework“ was necessary. The total time input required might, thus, have added up for any of the participants to a total amount of time in the region of 150 - 250 hours over a period of approximately one year.

For further information on this project visit the following website: 

At the end of the process, in January of 2006, the 126 hand-picked participants of the „Meeting of Minds“ project came up with a set of 37 recommendations concerning legal, ethical and economical aspects of modern brain research that deserve respect and show intelligent involvement. As nice and positive as projects like that may be, realistically seen they can hardly serve as a basic model for increasing the overall technological wisdom of the general population. We should not forget that there is not only brain research, genetic enhancement or nuclear energy, but maybe 50 to 100 other interesting and highly relevant technologies to be covered when the goal is overall technological wisdom. And, as mentioned above, people also have busy lives. If they want to be well integrated, well informed and well to do middle class members of modern societies they have jobs, families, children, houses that require time input, they have to take care of their health, get additional professional training, read the paper, etc. Overburdening and expecting too much is one main source of the problems described above concerning the possible erosion of general technological wisdom. To surpass the threshold of what is possible for people as a time commitment is counterproductive in developing the democratic capabilities of members of modern high tech societies, as much as this may appear necessary for any important topic.

This is the background for the 10 - 12 hours expectation for this one topic that the following standard curriculum is based on.
9.2. The Standard Agenda for the Discussion of GEHB

This section is a summary of the presentation that was given in the first half of two workshops on GEHB that led to a very refined decision-making process. A detailed account of the experiences during a few test workshops is given in the following section, together with a few commenting and concluding remarks.

Suggested agenda in the form of presentation slides:

<table>
<thead>
<tr>
<th>Presentation of the ENTRY SCENARIO:</th>
<th>Consideration of the RELEVANT ISSUES:</th>
<th>Production of the POLICY PRINCIPLES:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• GEHB-Capabilities are in Development</td>
<td>• Technology Safety</td>
<td>• For the Biomedical Suppliers in the Future</td>
</tr>
<tr>
<td>• There is a huge latent Demand</td>
<td>• Attitudes towards Nature and towards Evolution</td>
<td>• For the Reproductive Decisions of Parents-to-be in the Future</td>
</tr>
<tr>
<td>• The feasibility of GEHB is not certain but likely</td>
<td>• Human Dignity</td>
<td>• For Society as a whole in the Future</td>
</tr>
<tr>
<td>• Therapeutic Options might be not so far away</td>
<td>• Distributive Justice</td>
<td>• For Research &amp; Development today</td>
</tr>
<tr>
<td>Etc.</td>
<td>• Parental Liberty vs. Communitarian Views</td>
<td></td>
</tr>
</tbody>
</table>

The learning procedure on GEHB should consist of three parts:

- The technological scenario that serves as a wake-up call for those who believe that the technology of GEHB is far away or completely impossible

- An explanation of the existing (and published) ethical thoughts. Without this input the participants of the learning procedure start to „invent the wheel“ and go through thought processes that consume
time quite inefficiently. The crucial element for the quality of the process in this stage is not only the qualification but also the neutrality of the presenter.

- There must also be a decision-making part. There must be room for discussion and the exchange of views, but the participants must also learn that in the end of all the pondering an ethical decision has to be made.

### 9.2.1. The Part on GEHB as a Technology

In this section the participants should learn briefly about the history of genetics and how rapidly it has developed since 1953. They should hear a little bit about the literature on the topic of genetic enhancement. (A selection of fiction, ethical non-fiction and legal-political literature is given below).

**Fiction writing and films, for example:**

- *Aldous Huxley: Brave New World* (1932)
- *The X-men series (first published in the 1950s)*
- *GATTACA* (1997)
- *Artificial Intelligence* (2001)

**Blueprint** (2003)

The most important books on the discussion on genetic enhancement of the last 10 years should be mentioned:


It must be explained what the most common visions of brain enhancements are in the literature mentioned above:

**Brain enhancements**

- **Better motor skills, quicker reaction, etc.**

**More cognitive powers like**

- **More intelligence,**
- **More memory**

**Better mood (it varies from author to author whether this means control over good and bad feelings or simply „installed permanent happiness” or a combination of the two)**

**Desire control, for example**

- **Appetite for food (like eliminating the genetic reasons for obesity)**
- **Sexual desires**
- **Anger control**
- **Empathy, „ego control,”, and altruism**
- **Better control of criminal behaviour**

**Various other ideas relating to**

- **Eliminating or increasing gender differences**
- **Curiosity and creativity**
- **„Productivity”**
- **Risk aversion or fearlessness**

**Etc.**

While it could make sense to elaborate a little more on these enhancement visions and even discuss them briefly at this point with the participants, it is important to keep them focused on this specific kind of enhancement. Otherwise the discussion risks getting derailed into talking too much about
other kinds of enhancements like longevity, athletic capabilities, supersenses, etc.

The following official statements should be mentioned. Crucial passages in the text should be read out loud as a group to make the participants aware of the status of international law concerning GEHB:

- *UN Declaration on the Human Genome and Human Rights* (1998)
- *UN Declaration on Human Cloning* (2005)

Of course, it is important to explain the main features of the technology and to point out the limits to other, related technologies in order to reduce complexity (see slide below). Care should be taken not to spend too much time on this aspect, especially when there are scientists and enthusiastic engineers in the audience.
The likelihood of the technology of GEHB being developed should be discussed to some extent. For the ethical discussion it is important that there be some basic understanding about the driving forces of this technological development. I believe one should not be too shy in giving opinions as a presenter as long as they are clearly defined as opinions and not as facts. Expressing an opinion can also be a useful tool for spurring discussion: Examples for such opinions are:

- "I believe that GEHB technologies are more driven by eager parents than by profit-hungry corporations," or
- "I believe that within the next ten years we will use therapeutic GEHB while it will take another 20-30 years until pure enhancement is possible."

Remarks like that might create a suspenseful environment for the participants, but again, the statements on what is opinion and what is fact must be very clear and may never be mixed.

Besides, it might add some illustrative color to provide the following statements to the participants on a slide, briefly:

<table>
<thead>
<tr>
<th>Market Forces Push the Development of GEHB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>After watching the movie &quot;GATTACA&quot;, thousands of people called the movie company to find out about real-life possibilities of genetic enhancement.</strong></td>
</tr>
<tr>
<td>A recent opinion poll is presented by the Baruch report that was produced in 2005 by the Bioethics Center of the Johns Hopkins University. The Center’s 2004 survey of 4,834 Americans found relatively high levels of approval for the use of IGM (as well as other reproductive genetic technologies) for “health-related reasons”.</td>
</tr>
<tr>
<td>For example, 57 percent approved of IGM to avoid fatal childhood disease while 19 percent approved of the use of IGM to have children with “desirable traits”. (IGM=Inheritable Genetic Modification)</td>
</tr>
<tr>
<td>In 1998 a new boutique, Gene Genies Worldwide, opened in a trendy shopping area in Pasadena, California. The store claimed to sell new genetic traits to people who wanted to modify their personalities and characteristics of their child. ... most people entered the store ready to plunk down their credit cards to change the genetic inheritance of their families. ... one man surprised everyone by asking for the survivability of a cockroach.</td>
</tr>
</tbody>
</table>
Also, the example of the development of the flight technologies is an interesting one to show the enormous speed of development that is possible. It also shows how fast human societies get used to the most unbelievable tools and that humans are by far not limited in their creativity by what nature developed (see below).

### The Development of Flight Technology as an Example

- Probably since prehistoric times: The ability to fly has always been the dream of mankind
- 1492 – Leonardo da Vinci describes a flying machine
- 1783 – Joseph and Etienne Montgolfier launch the first hot air balloons
- 1853 – Sir George Clayey builds and demonstrates the first heavier-than-air aircraft (a glider)
- 1900 – Ferdinand Graf von Zeppelin build the first successful airship
- 1903 – Orville Wright and Wilbur Wright fly the first motor-driven airplane
- 1947 – The first supersonic flight
- 1960 – The modern helicopter had been developed and was use in the Vietnam war
- 1981 – The first flight of the space shuttle
- 2004 – Space Ship One takes the first commercial passenger into space
- 2007 – a medium sized airport like the one in Munich/Germany processes on average more than 80,000 flight passengers per day.

- Please Note:
  - Helicopters have supra-natural features
  - Modern Jets have supra-natural features

The other slide that gives a glimpse of the likelihood of GEHB technologies to come is the Conversion-of-Technology-Theory of Gregory Stock (see below, next page). Concerning the Huntington Disease, a short paper should bring the participants up to date concerning an example of a single gene disease as a study of a case were it might be difficult to deny the approval of germline interventions from an ethical point of view.
Especially concerning the topic of GEHB, it is crucial to inform learners about the physical complexity of the brain and, beyond that, about its dynamic nature. Participants have to understand that there are other, and maybe much more dominant, factors determining the structure of the brain of a human individual. This point is important enough to provide some case studies on a few pages to the participants in order to make the point. The case of sexual enhancement is a good example, but only in those countries with a liberal attitude towards sexuality. Dopamine and serotonin as targets for GEHB interventions are good examples as well.

It is important to point out to the participants that the human brain is in no way exclusively determined by an individual's genetic setup. Most likely there will be some knowledge on this point amongst the participants if the group consists of more intellectual persons.
The complexity of the brain in general should be mentioned briefly in connection with this slide. The participants should get a feeling for how little we know about the brain and how challenging brain research is. The following statements were provided to the participants to make the facts more fathomable:

If we multiply the number of neurons with the number of connections that they can form on average, we will get a figure that is impossible to fathom in its size: 100 billion x 10,000 = 1000,000,000,000,000 (1,000 trillion).

To make this less abstract: Imagine that the world population of currently six billion humans multiplies 15 fold to a number of 100 billion and each single person has 10,000 telephones attached to the ears and is communicating with another person on each of these constantly open telephone connections simultaneously at any given moment – this would be a realistic macro-model of the neural network that we carry in our brain.
This part of the presentation will directly and immediately lead to two points in the center of public discussion on GEHB: Technology safety and the delineation between therapy and pure enhancement. The following two slides illustrate these two points where there initially appears to be a consensus: technology safety on the one hand and the preference of therapeutic over pure enhancement applications.

**What all agree to: Technology Safety is Crucial**

- Approval of Law-Makers
- Technology Safety
- Consumer Attitude
- Product Liability Risks

**What is an acceptable Safety Level?**

**What all agree to: Therapy is more important than pure Enhancement**

**Case Studies:**
- Ritalin
- Cosmetic Surgery
- Preventative Germ Line Intervention
- Oxygen Supply Predisposition
- Growth Hormones

**Who deserves? Who decides?**

**Case Study:**
Regulation of Growth Hormones and the Question “What is the normal height?”
Some discussion time should be devoted to the discussion on the problematic difference between therapy and pure enhancement. It is important for the participants to understand that it might be very tempting and seemingly very logical to use the distinction between these two intentions for the application of GEHB technologies as a basis for ethical decision-making. They should be equally aware of the fact, however, that there are some traps waiting as well. Participants should realize that the definition of a „minimum standard“ in matters of intelligence, memory, mood, anger control, etc., is in the end a matter of cultural agreement and not of a definition of „human nature“ that could be determined with an empirical-scientific approach. A good example in this context might be defining the intelligence level that is dysfunctional and deserves our repair, for example by applying „therapeutic GEHB“.

---

**Awkward Attempts to define “Enhancement” and “Therapy”**

- **IQ above 200:**
  - “Vanity to strive for this level“?

- **IQ 100 up to 200 (IQ 200 = Einstein-level):**
  - “Best in class-approach”

- **IQ below 100:**
  - “Everybody deserves to be at least average”

- **IQ below 50-70:**
  - “Dementia that deserves therapy“?

---

Who deserves? Who decides?
9.2.2. Portraying the Ethical Positions on GEHB

In this subsection of the learning process, structure is the key for the participants to be able to follow. The following slide shows an attempt to bring structure into the various philosophical arguments relevant for GEHB:

![Diagram showing relevant issues for decision making on GEHB]

It is difficult and at the same time crucial at this stage to find the right balance between simplifications on the one hand and completeness on the other hand. The contents can be varied to adapt to the knowledge level and intellectual capabilities of the audience.

The images of human nature and human dignity must be discussed, but this is difficult to do such that it is not offensive to people who believe in the separate creation of human beings by God or who highly respect human dignity theories. To make them reconsider the basis of their beliefs, a careful confrontation with the ideas of Peter Singer and with the ideas of Peter Sloterdijk might be helpful, unless this leads to such a heated discussion of these more abstract philosophical issues that the more utilitarian pros and cons can no longer be discussed. In sum, this discussion on human nature
and human dignity must be initiated but also stopped at the right time. The goal is for participants to understand that there is more to be discovered beyond the simple "knee-jerk" rejection of GEHB derived from these classical positions of non-instrumentalization and human dignity. Precisely because these classical positions are so popular, this closer examination of them must be included in a workshop on enhancement.

In particular, it might be intellectually stimulating for the participants to consider seemingly radical positions on technology safety like these, for example:

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**The Claim that Human Development is more important than absolute Safety**

<table>
<thead>
<tr>
<th>We are permanently victimized by our own technology but go on using it anyway:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plane crashes</td>
</tr>
<tr>
<td>• Car accidents</td>
</tr>
<tr>
<td>• Workplace accidents</td>
</tr>
<tr>
<td>• Household accidents</td>
</tr>
<tr>
<td>• Environmental damages</td>
</tr>
<tr>
<td>• Medical maltreatment</td>
</tr>
<tr>
<td>• Side effects of drugs</td>
</tr>
<tr>
<td>• Machines are not only stress avoiders but also stress producers</td>
</tr>
<tr>
<td>• ...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature victimizes us permanently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per hundred babies born, a few have defects. Some of them due to genetic predisposition, some of them because the birth procedure or the pregnancy caused it. Some of the handicaps become apparent immediately, others only much later.</td>
</tr>
<tr>
<td>Some of the natural features are suboptimal for the life we choose or want.</td>
</tr>
</tbody>
</table>

There is a human right to get the best possible DNA. Who says nature will provide that for each and every human individual?

---

It might be equally interesting and stimulating to show the participants that our existence as products of a cultural evolution makes the philosophical starting point for the discussion of GEHB somewhat difficult to determine (see the next two slides below):
The Claim that we are allowed to take Evolution in our own hands and we actually we already did

**Beauty Enhancement:** Hairdressing, manicure, pedicure; creams, perfumes, jewelry, women’s make up; earrings; piercing; tattoos; cosmetic surgery for skin, fat removal, nose correction, eye correction, Hair Coloring, etc; ...

**Body Enhancement:** Clothes, shoes, equipment for scuba diving, sky diving, space travel; artificial limbs; organ transplantations; pace makers; ... bodybuilding and sports; ...

**Vision Enhancement:** Eyeglasses, contact lenses, laser operations for the eye; binoculars; infrared night vision devices; ...

**Tooth Enhancement:** Tooth brushing, braces, tooth fillings, gold inlays, artificial teeth implants; ...

**Health Enhancement:** Vaccinations, vitamin pills, drugs against diseases, all medical treatment; ...

**Communication Enhancement:** Telephones, e-mail, microphones, ...

**Memory Enhancement:** Computers, data basis, the internet, documents on paper ...

**Intelligence Enhancement:** Calculators, language software, search engines, ...

**Emotion Enhancements:** Valium, Prozac, Ritalin, Alcohol, Nicotine, Cocaine, Opium, ...

**General Brain Enhancement and Behavioral Enhancement:** Education, meditation, training, parenting, studying, NLP; And also: elite education in Harvard, Princeton, Oxford, etc.

The Claim that Cultural Evolution Determines us more than Natural Evolution

**NATURAL EVOLUTION**

Two ruling Principals:
1.) Survival of the individual is necessary to be able to reproduce
2.) The number of descendants determine the contribution of the individual to the gene pool

It seems that human biology more and more follows human culture

**CULTURAL EVOLUTION**

Three Consequences:
1.) Also the human with a maladapted body can survive and reproduce.
2.) The individual can theoretically determine the number of descendants deliberately and will do so according to cultural factors
3.) Cultural fitness (e.g., the ability to accumulate power and money) has become more important for reproduction than physical fitness
4.) Cultural Fitness also determines Physical Fitness – maybe even more than the other way round?
Likewise, it might be helpful and stimulating to present radical minority opinions like the following one:

The Claim that we have to enhance ourselves, otherwise the Human Species is doomed

Groups who are able to take this in a neutral, rational way could then also be confronted with the „Letter to Mother Nature“ of Max More or with some excerpts from the website of the World Transhumanist Association.

One of the goals of the workshop in any case should be for the participants to learn about the following pros and cons concerning GEHB that I call „secular - utilitarian.“ The following slide gives an overview of factors that should be mentioned:
Undoubtedly, these factors need to be explained in some minimum detail. The following points could be addressed to achieve this learning goal:

**Unintended physical side effects**

Typical examples in the anti-enhancement literature are:

- **Overshooting of the enhancement goal, e.g.**
  - Too much dopamine leads to novelty-seeking addicts;
  - Too much aggression control leads to docility
  - Too much pain control leads to carelessness

- **Trait Packages, e.g., it could be that…**
  - Increased intelligence only comes with slight autism;
  - Increased alertness also leads to insomnia
  - Increased empathy leads to oversensitivity and to depression

*Long-term side effects* that appear at a later age after many germline modifications of this kind have already been performed
Unintended psychological Side Effects

Typical examples in the anti-enhancement literature are:

- *Alienation between parents and children*
  - Traits as a product = children as a product?
  - Will parents sue for malpractice if their child does not turn out as intended?
  - Will children sue for maltreatment or malpractice if they have lifelong problems?
- *No challenges = No real satisfaction - the doping problem*
  - Life would be dull and empty if there were no more real challenges
  - Life would suffer a loss of meaning and be boring without any struggle
  - Only the un-enhanced winner will be able to enjoy his fair victory.

(But: brain researchers do not completely agree with these statements. Besides, enhancement might also level out natural *disadvantages.*)

- *By pursuing positional enhancements, frustration is assured*
  - What is available to everybody cannot be a means of differentiation

Unintended societal side effects

Typical examples in the anti-enhancement literature are:

- *GEHB is adverse to distributive justice*
  - „GenePoor“ and „GeneRich“
  - There is too much research funding for purposes of vanity, instead of fighting against real problems that affect mankind, like malaria
- *Loss of flavor in human life*
  - Human individuals will become overspecialized following several generations of enhancement
➢ The gene pool will become dangerously impoverished

• *Structural oppression form yet another technology?*

➢ GEHB technology will constitute yet another form of oppression

➢ Standards will be set by everybody and will have to be followed by everybody

➢ Genetic data will not be secure any more, privacy will be endangered, „GATTACA-style“ living conditions might become reality

• *Parental power will be increased tremendously with GEHB technologies – do we want that? How do we control this?*

It is worth spending some time on these issues since there is still an abundance of potential difficulties and open questions on genetic enhancement in general and on GEHB in particular. Only when this wealth of potential problems has sunk into the minds of the participants will they be ready for the next mental step. It will almost automatically lead intelligent workshop participants to the question whether we aren’t reaching the „human limit“ when developing and applying this technology; less intellectual participants will probably have to be guided to this question. The following slide might pave the way to this recognition and it also shows that there are religious as well as secular roots for this assumption of human limits (see below, next page)
The perfect example for what „human limit” means in the context of using technologies is either nuclear energy in its military form or eugenics. Eugenics is much more recommendable since it is so highly relevant in the context of discussing genetic enhancement and since the history of eugenics in the first half of the 20th century is the perfect illustration how unbelievably naïve and destructive the application of „scientific” knowledge can develop even in highly educated and fully democratic societies like the United States.

There should not be too much discussion at this point and at this level of philosophical abstraction. Rather than that, this last topic of human limits should be used as a bridge to come to the third and last part of the learning procedure: the making of bioethical decisions.
9.2.3. Creating Bio-Political Guidelines

Decision-making is hard work. It is hard work because all the relevant factors have to be sighted, evaluated and then weighed against each other. Priorities have to be set and decisions have to be formulated in such a way that the words really express the decision and do not leave any room for misunderstandings or misinterpretations. All this is hard mental work, but there is also „psychological work” to be done: one has to overcome the inner resistance to give up the flexibility of not having decided yet. Every sales person has experienced this effect when people shy away from the last step of making a decision and as long as they haven’t committed themselves everything is still possible. People like to flip-flop unless they are forced to a commitment, they like to talk and to criticize and to ponder this or that but they dislike doing the mental and psychological work of thoroughly evaluating – weighing – prioritizing — verbalizing - deciding.

But, unfortunately, when we are confronted with new technologies, it is ethical decisions that are needed urgently and we MUST make decisions. Avoiding ethical decisions in the development phase and not using a new technology are in reality de facto decisions which are consciously or unconsciously made on an ethical basis. As briefly discussed above (and more elaborately by Bill McKibben), parents will probably not have the choice whether to have their unborn child tested for the gene that causes Huntington’s disease once this is possible; they will be forced to consider enhancing the intelligence and memory capabilities of their future child if a world develops in which all other parents do so. Politicians will have to make decisions on what should be allowed or not. Scientists and business managers of the biotech industry will have to make decisions in what research to invest in. The list goes on and on.

Decisions are already difficult to reach from the point of view of an individual person and his individual interests, because many conflicting arguments and emotions have to be weighed. They are even more difficult to make from the point of view of society, however, because then the living conditions and rights of not just one person must be considered, but every possible combination thereof. The most difficult position is, thus, that of the policymaker. He must answer the question: „How should this be regulated?“

To make participants consider this difficult question and to enable them to create qualified answers, starting out with a scenario is a good idea. This
gives the participants a role to play and a situation they can imagine. This is even more important in the case of GEHB, since this technology does not even exist yet and a little imagination has to be used to proceed mentally. Here is a scenario that successfully sparked a very creative policy discussion during two workshops held at the Ludwig Maximilian University in Munich in January 2007 (see details below):

Please imagine the following:

- A biotech company has just applied for permission in several countries to perform a first germline intervention on a human embryo with the intention to manipulate the physical structure of the brain of the future human being.
- This has triggered the government of your country to form a study group in order to come up with basic rules for this type of technologies.
- You are invited to participate in the study group that is supposed to come up with suggestions very soon.
- Your government leaves the study group complete freedom as to which solution to suggest - from a total ban to a total promotion and everything in between - all is possible and there are no preset limits.
- The only condition is that you have to develop all encompassing rules that have sufficient scope and quality to be the basis for law-making. The more detailed the better.
- It is already known that a few governments of other countries will give a positive answer to the application of the company."

It is possible that the participants would come to different conclusions if they were asked what they consider appropriate for themselves and what they would opt for as a policymaker. But this ethical schizophrenia does not commonly exist in so that the answers found in the framework of the scenario also reflect to a great extent the ethical basis of people's decisions for their own lives. This was also confirmed in a small empirical test during the four workshops that I held to test the agenda suggested in this chapter.

It should be emphasized at this point that there is a difference between ethical decisions and the according behavior. There is definitely a large overlap, more or less great depending on how much a person is ethically minded, but there is hardly ever a total determination of the actual behavior of people by what they consider ethical. To be specific in relation to GEHB: it
could well be that people would regulate GEHB very strictly, that they answer that they would not want to have it applied for themselves and for their children, but when the technology is actually available they would use it anyway. Of course the flip side of this effect is conceivable as well: Technology enthusiasts might shy away from using GEHB once it is actually here and available, since only then do they start considering the possible implications in very practical terms. But this question of how much human beings actually implement decisions that they have taken previously is too large of an academic problem to be investigated thoroughly here.

Coming back to the workshop, the participants usually need some help concerning the parameters for making bio-politics. One of the key messages that has to be delivered to the participants in this respect is the fact that there are more options available than banning or allowing something. This information could be presented to the participants, for example:

The following „List of Options for Regulating Technologies in a Liberal Democracy“ shows that there is already now in everyday policymaking much more than black and white, instead there are many shades of grey in between (Hughes, 2004, page 239):

„Mandatory, no exceptions“ e.g., emissions controls on cars, and quarantine of dangerous infections;

Required, but with religious exemptions, e.g., the military draft, vaccinations;

Publicly funded and encouraged, but not obligatory, e.g., public school

Encouraged, but unsubsidized, e.g., exercise

Publicly funded, but not encouraged, e.g., birth control of abortion in some states (birth control OR abortion?)

Available unsubsidized on the market, e.g., over-the-counter drugs

Available, but controlled by prescription, e.g., Prozac, Ritalin, etc.

Discouraged by taxation and education but not banned, e.g., smoking

Banned, e.g., illegal drugs, some weapons, dangerous toxins.“

Also, even though the parents are the focus of GEHB regulation, it should be made clear that there are a lot of players conceivable that could be given a role if the workshop groups think this makes sense:

*These are the most obvious options; others may be possible as well:*
- The parents
- Government authorities
- Lawmakers
- Bioethics commissions (who is in there, nominated by whom?)
- The medical community
- Biotech corporations
- Scientists
- Others

Last but not least, it might make sense to actively address the problem of enforcing GEHB regulations on the national level only (as opposed to the international level) since this discussion might come up anyway and take away valuable time. An option that also makes sense is to keep the following slide ready, to show only if the discussion actually comes up.

### The Discussion about Enforceability of National Legislation on Genetic Enhancement

- Only international laws really make sense!
  - It is easy for parents to travel to other countries to get whatever treatment they want
  - If you prohibit it in only one countries it will be more feasible for the rich who are more mobile than the poor – so you don’t prevent it but you make it a product of the upper class
  - Look at the example of abortion in Ireland

- International consensus is unrealistic and national laws are good enough
  - It would be crazy to wait for international laws because then we would have no laws in nothing
  - To make something illegal does not always prevent but it stigmatizes it
  - No law is perfectly enforceable including international law
  - Control of illegal drugs works quite well on a national basis
At the end of the workshop the following scenarios could be used to test whether the decisions made actually reflect what the participants really feel in a process of a playful self-reflection.

Scenario 1:

➢ Imagine you are a family consultant. A couple comes to see you who are just seeking permission for a genetic enhancement treatment of their future child. They already have two children who are extremely aggressive and they want a third child, but only if it is „normal.” A doctor has offered to modify the genes that cause a predisposition for a certain average adrenaline and testosterone level in the brain. The procedure has never been done before but there are several independent scientific reports saying that the intended intervention is based on sound knowledge and should not fail. During the visit of the parents the mother becomes very emotional and begs you crying to give your approval. Your approval is the missing piece for the parents - if you say yes, they can go ahead.

➢ What would you think, feel and do now?

➢ Would advise them not to have the genetic enhancement performed, and if so, why?

➢ Would you give your approval, and if so, why?

Scenario 2:

➢ Imagine you are the same family consultant as in the previous question and another couple comes to see you. The father is suffering from chronic depression and has to take strong medication every day. Tests say that the father’s condition is most likely due to a genetic predisposition. The couple is afraid to have children fearing that they will pass on the „depression genes” and is seeking permission for a genetic enhancement procedure to achieve a permanently reduced serotonin level for their future child. Again, your approval is decisive for getting this permission.

➢ What would you think, feel and do now?

➢ Would advise them not to have the genetic enhancement performed, and if so, why?

➢ Would you give your approval, and if so, why?
Scenario 3:

- Imagine you are a high ranking officer of the government authority responsible for permitting genetic engineering procedures. A well-known billionaire comes to see you. He tells you about a genetic enhancement method that would enlarge the empathy center in the human brain. He presents several sophisticated scientific studies that show that the intervention would be based on state-of-the-art scientific knowledge and that the likelihood of failure is lower than 5%. In any case, even if the enhancement fails there are supposedly no negative consequences for the individuals, while in case of success they would be more altruistic. The billionaire wants to offer the procedure for free and offer a payment to willing parents around the globe that would in the end consume all his fortune. He imagines that this could be his philanthropic contribution to a better world. Again, your approval is decisive.

- What would you think, feel and do now?
- Would advise them not to have the genetic enhancement performed, and if so, why?
- Would you give your approval, and if so, why?

Scenario 4:

- Imagine that at some point in the future, the government of the United States considers making a genetic modification obligatory that would install an automatic appetite control into every citizen’s brain. Being overweight and its consequences has become the number one health problem and the “war on obesity” did not yield the desired results. In animal tests the necessary genetic modifications have proven to be 100% reliable in their desired effects; initial tests with human volunteers have yielded similar results.

- Since the issue is so hotly debated, the government decides to hold a referendum – the first of its kind in the history of the United States.

- How would you vote - in favor of making genetic appetite control obligatory or against it?

Not surprisingly, due to the trickiness of these scenarios, the participants in all of the test workshops ran out of time before reaching a conclusion.
9.3. Some Experiences with using the Suggested Agenda for the Discussion of GEHB from an Ethical Point of View

In this chapter the experiences with four real workshops on this topic are described and analyzed. It should be borne in mind that the suggested agenda and slides presented above are the result of these trial runs, not the theoretical solution that existed prior to the beginning of the first workshop.

9.3.1. Basic Assumptions for the Empirical Research

The starting point for the design of the empirical tests was the following basic assumptions on how to qualify the broad public for a discussion on the ethical aspects of GEHB for a technology that might become available within the next few decades:

- To enable people to become qualified decision-makers in the field of GEHB, they must have a basic overview of the existing knowledge on the technological potential, as well as on the currently existing ethical and political arguments concerning GEHB.

- People do not want to spend a lot of time on this specific issue, since they all have busy lives and there are many other issues that they should learn about. I foresaw one-day workshops to meet this pragmatic limitation, knowing that any agenda that takes more time than that would certainly be easier to implement content-wise, but would also not be as generally usable.

- To bring people up to speed, one should provide an overview of what has already been published as a first step. The authors of books and articles on genetic enhancement and specifically on GEHB have invested considerable time and effort to collect facts and figures, developed sophisticated thoughts and have put all this on paper already, providing a very good launching point for building an opinion. Plus, the publications on this topic are exciting, stimulating and very diverse, offering interesting, well-balanced and content-rich food for thought.” As you may recall from chapter 2.1., the reason for summarizing the relevant knowledge for ethical decision-making on GEHB was exactly that: the
perceived necessity to provide a well-structured overview of the vast quantity of interesting but unordered material that is already out there to bring as many people as possible to that level.

- No agenda or curriculum can be universal in a sense that it is applicable for all target groups in all situations. Any standard agenda cannot be more than a basket full of raw material for a great number of variations of this standard agenda. The truth behind this statement becomes immediately obvious if you consider the enormous variety of possible target groups ranging from 15-year old high school students to the staff of a molecular biology laboratory to a group of journalists to politicians to artists to philosophers, etc. Should GEHB technologies become available, then even those parents-to-be with a lower educational level would have to become qualified decision-makers in a very concrete and urgent manner. This would require yet another, quite distinct variant of the standard agenda for the ethical discussion on GEHB that this book intends to provide.

- Given the fact that standard agendas are by nature more a source for further adaptation and refinement than a ready-to-use object, the completeness of this basket of raw material may well be the main quality criterion. Hence, while an agenda for the discussion on GEHB that is tailor-made for a specific target group resembles more a TV dinner than a gourmet restaurant meal, a standardized agenda is more comparable to a well equipped kitchen cabinet that should contain a complete set of all the necessary ingredients for cooking a whole range of different meals and should provide these ingredients in neatly packed units stored away in clearly labeled drawers.

Following the logic of these assumptions, the first and most important step necessary was the checking of the completeness of these ingredients, i.e. of those bits of knowledge and ethical arguments that are needed to follow and participate in the discussion on GEHB in a qualified way. This logical step led me to decisions about the set-up of the empirical test concerning the following factors:

- The scientific method of the empirical test
- The workshop locations and participants
• The method of documentation
• The workshop material and program.

Let me briefly describe what decisions I made and why.

9.3.2. Decisions on the Scientific Methods of the First Empirical Tests: Qualitative Research as the Scientific Method of Choice

I did not want to find out what the participants in the empirical tests already knew and thought; instead, I wanted to create good quality material for „teaching.“ In this situation, a qualitative research approach seemed the most obvious choice. Due to the fact that I had only limited means to do research, I also had to use the pragmatic approach that especially the „Grounded Theory Making“ of Glaser and Strauss provided: Ideally you go on until there is no more new data to be found and a „saturation point“ is reached – but from a pragmatic point of view it is also acceptable to continue until your resources are depleted and then report what you have found up to that point.

There is another crucial feature of qualitative research that was very advantageous for the work of developing good workshop material. Qualitative research allows for changes in the method as research is proceeding. This is what I clearly needed since my intention was to improve the material that I used after each research step to increase the quality as quickly as possible.

9.3.3. Decisions on the Workshop Locations and Participants: Four Workshops, Three Countries, 34 Participants

I arranged a mini-series of four workshops with a majority of people whom I considered „experts,“ not in the narrow sense that they had already studied GEHB and its potential implications on human living conditions, but in a sense that they were either trained as philosophers with a great interest in scientific topics or were scientists with a great interest in philosophy. Three of the workshops also included „non-experts,“ defined as people who did not have a background in philosophy, medicine, biology or neuroscience.
I also wanted to get some geographic variety:

- Germany is a very special place when it comes to genetics and in particular genetic enhancement due to its historic experience with eugenics during the Nazi period. Thus, only work on the development of the standard agenda in Germany would entail the risk of distortion based on this very specific situation. Conducting one workshop in my home country of Germany seemed acceptable, but I was convinced that another workshop in at least one more country was necessary to even out any potential anti-GEHB bias.

- The most important books on genetic enhancement published during the years 1998 to 2006 were all written in the United States by U.S. citizens (Lee Silver, Gregory Stock, Francis Fukuyama, Leon Kass, James Hughes). Therefore, it made sense to conduct one of the test workshops in the United States.

The exact locations of the four workshops and their participants were also due to a certain degree of coincidence and availability of contacts, interest, dates, etc. In brief, practical and not just scientific factors also came into play.

In the end, workshops took place in the following locations:

- **The Center for Bioethics, the University of Pennsylvania, U.S.A., October 2006.** There were 14 participants, of which 12 were students of a master’s program in Bioethics. In addition, there was one senior lawyer and one expert on artificial intelligence who were not students but older scholars who participated because they were interested in the topic. Five people had an educational background in either biology, neuroscience or as a medical doctor, 9 people in various other majors ranging from psychology (2), to philosophy (2) to law, history, public health management, etc.

- **The University for Humanistics, Utrecht, Netherlands, November 2006.** There were 7 participants of whom 5 were members of a research group on genomics and societal aspects within the university. There was one bioethicist from another university, plus one of the
professors of the University for Humanistics who had recently written a book on reproductive decisions of women in India.

- **Department of Philosophy, Ludwig Maximilian University, Munich, Germany, January 2006.** There were a total of 8 participants of which 3 were highly trained neurobiologists, 2 were philosophers and there were 3 „non-experts.“ This workshop had an unusual concentration of neurobiological know-how- and the discussions on the technological aspects of GEHB reflected this in a very interesting way.

- **Department of Philosophy, Ludwig Maximilian University, Munich, Germany, January 2006.** There were a total of 5 participants of which 2 were philosophers, one was a biologist and 2 were „non-experts.“ None of the workshop participants in the second Munich workshop had participated in the first one a few weeks before.

I dropped my initial intention to also hold a test workshop in Asia because I developed serious doubts on whether the additional knowledge gained would really warrant this considerable investment. For one thing, talks with an American bioethicist who maintains intense contacts to China and Singapore gave me the impression that the development of bioethical thinking was very rudimentary in many Asian countries compared to what it was in the United States and in Europe. This also confirmed my findings from research of the available literature on genetic enhancement. If the intention is to enrich the content material of a standard agenda, then disappointment seemed too great a risk if these assessments were really true.

Another reason for judging Asia as an important test ground faded away the more I investigated it: The image that there is something like „typical Asian values“ that are profoundly distinct from „Western values.“ This image that I had in mind most likely came into existence during the upswing of the Asian economies in the 1980s and early 1990s, when Western thinkers desperately tried to find out what it is that made the Asians so much more successful in growing their economies than the Europeans and North Americans. The answer they quite often gave was that it is a matter of „Asian values“ ranging from more dedication and more focus to more submission and acceptance of the rule of benevolent dictators like Singapore’s Lee Kwan Yew. In the field of bioethics, those images of typical Asian val-
ues received new nourishment from Korean cloning experiments and Chinese eugenics laws in the 1990s and in the early 21st century. But great doubts about this image of „Asian values” are justified when we carefully study what Asian thinkers really have to say about the necessary preconditions for ethically sound genetic enhancement. As I have described above in an earlier chapter, these statements may be less profound and less numerous than in Western literature, but in their core contents they are very much in line and sometimes almost equal in tone and wording to what secular Western bioethicists have to say. All of them assume solely good intentions of parents, all of them demand benevolent applications and an improvement of the human condition for allowing genetic enhancement to become acceptable and all of them worry that humans might not be wise enough to handle this new „tool.” What appears to us to be Asian „flexibility” in matters of bioethics that we believe to detect could, therefore, have more to do with the low development stage of bioethical thinking in most Asian countries than with a well considered ethical position that is more lax towards the ethical standards of genetic enhancements.

After pondering these questions for a long time, I decided that a test workshop in Asia would probably be nice to have, but not crucial for improving the quality of the standard agenda.

9.3.4. Decisions on the Method of Documentation

The improvement of the material was an ongoing process. Every word that was misunderstood by the workshop participants, any interesting example or aspect that came up in the discussions, any structural question or terminology problem they had was immediately scrutinized by me and entered into the main text of the book. The participants of the respective next workshop did not get to see this in writing but I tried to orally quote whatever had come up in a previous workshop if this became relevant.

Immediately following the workshop, I made extensive notes of all the details. If need be I used the sound recordings of the complete workshops that I had made and listened to certain parts of it. I made sure that the sound recording would not lead to any psychological distortion by promising the participants in all of the workshops that the recordings would be used ex-
clusively for my own notes and would be erased once all the information needed had been extracted.

All participants also completed anonymous questionnaires following the end of the workshop.

9.3.5. The Workshop Material and Program

As the organizer and moderator of the workshops I designed the workshop program and also provided material with which the participants were able to prepare for the discussions. This was sent to them a few weeks in advance by e-mail. Since my intention was to achieve constant improvement, the program I used kept changing in order to implement „updates” based on the previous learning experience immediately in the respective next workshop. But the changes made quickly became less and less radical and the difference between workshop (3) and (4) was almost nil.

The workshop participants in Philadelphia were told in an invitation letter that they were not necessarily required to read all the material that I had provided to them before the workshop, but that they should instead look for gaps in their knowledge and read only those segments that would fill the gaps. I had sent out around 140 pages of material, all of it selected excerpts from this book.

In Utrecht I had sent out the same package of material but did at first not issue such a statement concerning the freedom of choice on what to read. I was forced to do so about one week before the workshop was scheduled, though, because I was confronted with the very indicative question whether I could advise on which ones of the 140 pages are the most important ones and whether it was really necessary to read all of the material. I also recommended to all of the participants in Philadelphia and Utrecht to watch the movie GATTACA and to read the novel Brave New World. Upon request, I recommended to those with very little time to focus on my fictional stories (See Prologue) to get access to the ethical problems at stake.

For the two Munich workshops, I designed completely new preparation material. For one thing, this new material was shorter (a total of some 50 pages) and secondly, this material was not a real preparation for what I presented in the workshop. Instead, they were referred to and used as an integral part of the presentation. Thus one set of documentation did not build on the
other, but what the participants had done for preparation was repeated and integrated in the workshop itself.

The workshop in Philadelphia lasted for around 8 hours (from 9:00 a.m. to 5:00 p.m. with a working lunch). The workshop in Utrecht lasted from 9:45 a.m. to 2:15 p.m., but lunch was also served without taking a real break, so the total number of „net hours“ was 4 ½. The two Munich workshops lasted from 10:15 a.m. to 4:45 p.m. each with a lunch break of around 1-1 ½ hours, so some 5 hours of net workshop time.

In all the workshops, the basic content sequence remained the same:

- Present GEHB as a technology first
- Give some explanations concerning the ethical arguments
- Let the participants discuss the issues and let them then attempt to design bioethical rules

Out of fear of imposing too much influence on the participants, I did not give a real presentation in the first two workshops. Instead, I tried to restrict myself to putting an agenda on the table similar to what is used for a typical business meeting, simply stating the points to be talked about

The structure of this type of agenda for a public discussion of GEHB that I used in the first two workshops basically reflects the structure of this book, with only minor changes for purposes of simplification or clarification. This is what I handed out to the workshop participants:

„A) TECHNOLOGY Information

Genetics in general and what is relevant for the genetic enhancement discussion or not

1. The human brain

   1.1. Enormous complexity

   1.2. Dualist and physicalist views

   1.3. The problem of the dynamic development of the human brain

   1.4. Non-genetic enhancement methods

      1.4.1. Education and personal development

      1.4.2. Psychotropic drugs

      1.4.3. Futuristic electronic enhancements
2. Visions of genetic enhancement in general and of GEHB in particular...

2.1. in fiction

2.2. in modern transhumanism

2.2.1. Enhancement of bodily functions

2.2.2. Enhancement of cognitive powers

2.2.3. Enhancement of emotional and behavioural traits

3. Technology forecasts

3.1. „GEHB will never happen because there are better solutions”

3.2. Gregory Stock’s conversion of technology theory

4. Technology safety

4.1. The readiness of technology level

4.2. Technology safety has to be really high in case of GEHB, but what does that mean exactly? What kind of a failure rate do we consider acceptable?

4.3. How do we deal with the fact that genetic enhancement is „hardwiring” and thus irreversible?

4.4. How do we deal with the fact that long-term observations would take decades?

B) ETHICAL ARGUMENTS AND CONSIDERATIONS

1. „We should not try to play God”

1.1. The religious-spiritual point of view: A divine power has created us and only this divine power is allowed to change us

1.2. The semi-secular version: There could be a divine power not in the literal sense of the word but it could be nature or the universe or evolution …in any case, it is something far too complex for us to understand and change. If we are arrogant enough to change it anyway then it will explode into our faces.
2. "Germline modification contradicts the notions of human dignity and human rights."

2.1. International declarations

2.2. National legislation

2.3. The flip side of the argument: There is a human right to genetic enhancement

3. Therapy versus pure enhancement

3.1. Therapy is acceptable because it is in line with ancient ideas of its beneficence; but pure enhancement is not acceptable because it is vain and unnecessary

3.2. What exactly is the delineation between therapy and enhancement? What is dysfunctional and what is within the realm of normal variations?

3.3. The problem of defining human nature

4. Doubts about the wisdom of nature

4.1. Doubts that Homo sapiens in its present form is the "high-quality result" of evolution that he seems to be at first sight

4.1.1. Ecological concerns: The immense boom of homo sapiens destroys the rest of nature and thereby also the natural habitat of humanity

4.1.2. Moral frustration: Homo sapiens might be technologically clever but when it comes to wisdom, morality and social behavior, he is still very primitive

4.2. Doubts about the wisdom in the rules of evolution

4.2.1. Evolution does not have a recognizable (ethical) goal

4.2.2. The wisdom of nature in securing our survival as a species is questionable

4.2.3. The wisdom of the design of our brain is questionable

4.3. Human beings are completely detached from nature and from evolution and, therefore, genetic enhancement would be just another step in our cultural evolution

4.4. Max More’s "letter to mother nature"

4.5. Sloterdijk’s “Menschenpark”
5. **Secular and consequentialist technology scepticism**

5.1. Technology failures

5.2. Unintended side effects in a technological sense

5.3. Unintended side effects for society:
   5.3.1. Growing inequality
   5.3.2. Growing specialization

5.4. „Loss of meaning“
   5.4.1. Structural oppressions
      5.4.1.1. Data protection
      5.4.1.2. The setting of achievement standards
   5.4.2. Mental and emotional impoverishment „Loss of flavours“
   5.4.3. Assured frustration when pursuing positional enhancements
   5.4.4. Boredom and no real happiness without struggle and challenges

5.5. Human limits and modern hubris

6. **The bio-politics of GEHB**

6.1. Parental liberty and its limits

6.2. Options for government action

6.3. Problems of democracy in high tech societies

6.4. Education for democracy

It became very quickly apparent during the first workshop in Philadelphia that even well educated persons and even students of the Master’s program in bioethics need more input from the workshop leader in order to do effective work when it comes to bioethical decision-making on GEHB. The Philadelphia group was very dedicated, but even after 8 hours of being together in the workshop the resulting bioethical decisions were relatively meager. In the post-workshop questionnaire some participants explicitly recommended that the workshop leader provide more structure, more content input and more information summaries.

For the Utrecht workshop I tried to give a more elaborate entry statement, but still pursued the idea of leaving out content statements as much as possible. Again, the participants reacted with confusion and rejection to some extent.
The workshop agenda I developed for the two Munich workshops was, therefore, quite different one. I gave a presentation that followed the structure of the standard presentation as portrayed in chapter 10.2. We looked at a total of 47 slides, and I explained ca. one-third of them in detail. The participants were allowed to ask questions, which they did extensively. It was sometimes challenging to not let the general discussion start too early because otherwise the group would end up in lengthy discussions about some side issue, would get lost there and would lose the overview and the focus on the overall picture, repeating the scenario from Philadelphia and Utrecht to some extent. So I deliberately took away mental freedom by presenting contents, the price for a more fruitful advancement when it came to bio-ethical decision-making.

9.4. How the Workshops for Testing the Agenda of Discussing the Ethics of GEHB Worked out

9.4.1. The Good News First: The Completeness of the Agenda was confirmed in all Four Workshops

In none of the workshops did any argument, piece of knowledge or aspect of GEHB come up that was not covered in the book. It would be wrong to say, however, there was nothing new at all. For example, there were a few pieces of literature recommended by workshop participants that I had not read yet and that I found very interesting, even though they did not contain any new arguments that I had not already put forth; there were additional examples mentioned in the workshops, some of which I added to the existing text as valuable supplements, in particular to the wording of the chapters on psychotropic drugs, evolution, and biopolitics I made major changes as a result of the discussions during the workshops so that they are now – I hope – more understandable and easier to read than before. Nevertheless, there was nothing mentioned during the workshops by any of the participants that was not to be found somewhere in the kitchen cabinet that I had already filled with pieces of well sorted knowledge and ethical arguments derived from the publications that I had studied beforehand.
None of the thoughts of the workshop participants was such that it could not be placed in one of the categories that I had formulated beforehand. This is a result that is quickly reported but is, nonetheless, of paramount importance. If the 34 people sitting together in those four workshops, and especially those specific people with all their knowledge and their intellectual power, did not come up with any completely new aspects regarding GEHB, then I feel satisfied that this book has achieved its main goal of providing a complete collection of the most important ethical arguments concerning GEHB.

All in all it was much more the "teaching aspect" and the course of the discussions that offered the most difficulties and surprises for me during these empirical test workshops.

9.4.2. Negative and Positive Feedback from the Workshop Participants

Not surprisingly, some of the workshop participants disagreed on the weight that should be given to certain arguments. This is what was to be expected when discussing a new and fiercely debated topic; this is what was reflected in the public discussion in books and articles published in the last ten years, this was the scenario that I was prepared for. But that was by far not the only difficulty that had to be dealt with during the test workshops.

The fact that only excerpts from this book had been handed out to the participants previously to the workshops turned out to be a major problem, maybe even a mistake. Numerous times workshop participants claimed that there were aspects missing and perceived my deliberate and simplifying omissions from the workshop material as holes in the allegedly complete overview that they now wanted to point out and argue for. Each time I was able to point to concrete passages in the text of the rest of my book where the respective argument was already covered – or at least I could have done so during the workshop, but many times I deliberately did not do it since too much time was spent on this kind of dialogue anyway. Given the fact that these were all groups that consisted mainly of experts or at least of very interested people, an attempt to make them read the complete text of the book with some 350 pages might have been a better idea. After all, a surprising number of 9 out of 34 workshop participants declared that they had
spent more than five hours preparing for the workshop, an amount of time which would probably have been sufficient to read most of the complete book. The other ones might also have been motivated to read the whole thing since it offered the prospect of obtaining a complete overview of the topic, something which a selection of excerpts never does.

In general, my impression was that the material handed out was either not studied properly or it was not understood well enough. At least in the first two workshops this seemed to be the case. Test questions from my side in which I asked about knowledge that could be found in the texts provided by me clearly showed that the participants did not remember, had not understood or had not read the respective passage. Thus, it was unclear to what extent people had actually read the material. As described above, the workshop participants in Philadelphia and Utrecht were told that it was not obligatory for them to read everything and it seems that many used that freedom extensively. As a matter of fact I am certain only in case of 5 of the 34 participants that they had read the whole thing since they told me so.

Above all, I learned that people expect more leadership from a workshop organizer than I actually provided in the first two workshops in Philadelphia and Utrecht. The presentations given in Munich were, thus, definitely the right way to do it.

Admittedly, at this point one could well argue that the whole concept of testing the completeness of a standard agenda in workshops is not a good idea. And yet, I would still differ with that opinion, since many of the arguments came because people heard what others had to say, they registered whether this was in line or in contradiction with what I as the workshop organizer had to say, etc. – all of this was necessary to „tickle their creativity.” I am quite certain that many of the thoughts that people contributed would not have come otherwise, for example, in an interview. The group dynamic was very important.

During the Utrecht workshop, there were also more profound questions put forth concerning the sequence of topics on the agenda described above. The argument was that this sequence could very much play a role in predetermining the outcome of the ethical discussion and, therefore, the concept of a kitchen cabinet with drawers full of ingredients is an illusion. In particular it was claimed that describing the „hardware” of the scientific knowledge and the technology forecasts first and to only then turn to the ethical arguments afterwards brought a biased and improper twist into the
discussion. The claim was that this procedure suggested that the emergence of the enhancement technologies was inevitable, which was incorrect. Instead, so the argument went, the ethical motivations that play a role as possible guiding factors should be described first and the discussion of pursuing them by means of enhancement technologies would then be only one of the possibilities for reaching the ethical goals, and perhaps not the best one. Another workshop participant responded that philosophers are not really in a position to determine whether a new technology will emerge, that it is really the scientists who are in the driver’s seat with philosophers just observing and commenting but not steering. The argument was not discussed much more and remained unresolved.

In general, the Utrecht group very much focused on questions of procedure and methodology. This in combination with the fact that it only had 4 ½ hours made it the most “unproductive” workshop when it came to actual bioethical decision-making. In the end the Utrecht workshop participants insisted that I communicate my ideas concerning the future regulation of GEHB instead of even making an effort to design their own. I had offered giving my own opinion, a mistake that I would not repeat again.

A further problem was that many of the workshop participants brought their own “pet project” into the discussion. Many of them were academics who had already focused in their scientific endeavors on certain aspects of the discussion on GEHB or genetic enhancement, had considerable knowledge and interest in this one aspect and had sometimes already published about it. Of course, they wanted to discuss this one aspect in more detail. For example, one participant insisted that the correlation between religious adherence and attitudes towards GEHB should be investigated further (I had not handed out this chapter as part of the workshop material since I regarded it as more of a side issue and, besides, too close to theological topics rather than strictly philosophical ones). Another participant brought up again and again the claim that the negative role of profit-making companies is not mentioned in the presented agenda sufficiently, even though she considered it to be one of the major factors in the ethical discussion. My telling her that the more likely pushing force is probably overambitious parents did not prevent her from insisting on her point of view and valuable time was lost. In another workshop two of the participants had great difficulties accepting the thought that GEHB and free will are not necessarily two opposing ideas, because GEHB could either be used for limiting or for fostering free will (i.e., when “free will” is defined as impulse control) and at this
point in technological history, transhumanists actually argue more in favor of an increase of the power of free will.
Perhaps because of the problems that arose because of the pursuit of personal agendas, several people expressed the desire of a „more focused“ program provided by the workshop organizer, especially in the exit questionnaires in Philadelphia and Utrecht. But there could be another factor behind that as well that has to do with a criticism that a majority of the workshop participants presented to me orally after the end of the first two workshops: there was far too little time for far too ambitious of a program. The desire for more focus could thus have been an implicit suggestion how to solve the problem of a huge discrepancy between the scope of the content program and the available time: „Limit the discussion program to just a few key issues and do them properly!“ Since this required a pre-selection of focus points by me, this concept was in contradiction with my original idea of total neutrality.
Another difficulty turned out to be that some participants wanted more discussion (they usually expressed this during the workshop even though they remained very polite and subtle with it) while others expressed the desire for „more structure“ in the exit questionnaire. I interpret this to mean more teaching by the workshop moderator, more disciplined moderation, or both. In the end, all participants declared that they found the discussion very inspiring because the topic was so exciting and that they had heard many interesting and new things, even though they claimed that this had not changed their general view of GEHB. This must be taken as very positive feedback, given the fact that the entry knowledge was generally on a very high level: 10 of the 34 participants declared that they knew more than 70% of what had been presented during the workshop or in the workshop material concerning the technological aspects and 8 people said they knew more than 70% of the philosophical aspects presented, even though the workshop groups consisted mainly of people who were at home in the field of either philosophy or science.
Surprisingly, the new knowledge did not change people’s mind very much, or at least that is what people felt: only 3 out of 34 participants declared in the questionnaires at the end of the workshops that what they had seen and heard had changed their minds about GEHB. Of those who had adopted a different opinion, one person claimed a more positive, one person a more negative attitude and one person changed from „more positive“ to „not sure what to think.“ Given the intense discussion and opinion-forming in the group, this result is surprising at first sight, but is probably due to the fact
that most participants did not have a very elaborate opinion to start with and thus were not stuck by a complete change of mind that they perceived as such. GEHB is a very specific and „exotic“ topic after all.

9.4.3. The Idea that Workshop Participants Design a Qualified Set of Rules for Regulating GEHB turned out to be an Ambitious One

The original concept of the empirical test workshops foresaw that at the end of the workshops the participants would be asked to formulate moral principles that they think should govern research and the application of GEHB. The idea was that they would thereby apply what they had just learned during the preparation for the workshop and during the workshop itself. The goal was for the participants to gain an overview of the most important arguments. At the end of the workshop they should be able to just go through the list of issues covered and come up with basic rules for a code of conduct or legislation on the subject of GEHB.

This idea turned out to be ambitious, to say the least.

In the first one of the four workshops, in Philadelphia, the plan foresaw that two groups would work on formulating such principles separately and would then present the results to each other, thereby learning from this comparison that differing but well founded views are quite possible. The working groups were told to formulate no more than ten and no less than three such principles and they were given about 1 ½ hours to do so. Both groups came back with the required minimum number of three rules but those rules only covered a small portion of the issues concerning GEHB.

Both working groups reported that their discussions could have gone on for much, much longer and that it had been great fun to discuss. It seems that they had so much fun that they deviated too strongly from the given task and that at the end they had problems being disciplined and productive. Both working groups formulated a rule that related to the preference of therapy versus enhancement in some way, one of the two groups also produced an additional rule saying that any form of obligatory enhancement should be morally banned for good. All in all, the result was not very detailed, which the working groups also realized. Some frustration probably
resulted from this meager result which gave rise to the call for more structure in the exit questionnaire. Nevertheless, the groups did produce the minimum number of three rules that I has requested from them. These were the results of the working groups in their original wording:

**Group One**

*Rule 1:*

Safety is crucial and has to be assured by the FDA

*Rule 2:*

Germline interventions for purposes of therapy should be allowed.
Enhancement should only be allowed with strict restrictions and should be decided upon by ethics committees

*Rule 3:*

There should be ethics commissions supervising each and every case in which germline modification is applied. The rules of the ethics commissions should have to be approved by an independent 3rd party on a high political (national?) level.

I knew that there was one person in this group who voiced some affinity to the Christian religion and that there was one other person who declared openly to sympathize with the ideas of transhumanism. Given this background, I asked the group whether there were disagreements within the group and the answer was „yes, to some extent.” For example, there was heated discussion concerning the delineation between therapy and enhancement. It was also discussed whether there should be a general rule to allow every kind of enhancement as long as it is reversible and to control only those enhancements that are irreversible, i.e., GEHB. But all in all, the group had obviously discussed all issues peacefully.

**Group Two**

*Rule 1:*

Parents should be allowed to prevent inheritable genetic diseases
Rule 2:

*There should be no invasion of the privacy of genetic information and it should even be forbidden to provide incentives to reveal personal genetic data.*

Rule 3:

*There should be no obligations to perform genetic enhancements, even if it may make sense for society (for example, to eliminate a specific disease).*

However, there was disagreement within the group on what to do, for example, with women in prison who are pregnant or what to do with psychopaths. No rules could be found for pure enhancement due to the complexity of the issue.

On the basis of this experience, I prepared a set of 10 rules for the workshop in Utrecht. The plan was to give people the choice to either design rules from scratch or to read my draft rules and then discuss them. The Utrecht group anonymously and immediately decided in favor of the second option. The problem of the lack of time was especially pressing in Utrecht since the announced end of the workshop was at 2:00 p.m. and not until 1:15 did we get to the question concerning formulating rules at all. I can only speculate what would have happened if this time problem had not existed, but my guess would be that the choice in favor of discussing a prepared draft of rules as opposed to designing them from scratch would still have been the same. So the Utrecht group had the most competence in the field according to the exit questionnaire (4 out of 7 people said they already knew more than 70% of the scientific aspects discussed and 4 out of people also declared to already have known more than 70% of the philosophical aspects) and was at the same the only group that did not produce any of its own rules for regulating GEHB at all.

Does this mean that the high level of knowledge made people insecure and overly cautious to committing to any kind of statement? Was there a fear of being too simplistic, too unrefined, too undifferentiated in the framework of what is possible during a workshop lasting just a few hours? And if this is the case, is this caution justified or not? Or did the specific social structure and dynamics of the group prevent the single members from voicing their opinion concerning germline interventions? Or was there simply a misunderstanding about what was meant by the task of „formulating basic rules“ as one participant pointed out to me afterwards? Did my offer to hand out
draft rules kill any motivation of the group members to try ethical decision-making by themselves? I cannot answer any of these questions, but this experience made me reconsider the structure of the testing workshops quite radically. For the workshops that took place in Munich I chose a quite different approach altogether.

9.4.4. The Munich Workshops

The presentations given at the two workshops at the Ludwig Maximilian University, Munich, in January 2007 followed more or less the structure as described in 10.2., but questions of the participants also led to slight deviations from the pre-designed sequence of the presentation. The two workshops were almost identical: they both started with a well-prepared 2 hours presentation on the technology and ethical arguments, followed by a lunch break. The bio-political part was based on the scenario described in 10.2. In the second workshop I showed the one slide with the bio-political scenario at the very beginning of the workshop which I had not done in the first one. A difference in the factual course of the two workshops was that in the first one there were more participants (8 in the first one, 5 in the second) and there was an unusual concentration of very interesting neuro-scientific know-how present that made the group discuss the science aspect more thoroughly. In addition, my presentation was longer and the lunch break turned out to be longer as well in the first workshop, so all in all the first group had almost one hour less for the bio-political discussion than the second group.

Still, the success of the concept of starting the workshop with a thorough presentation and the difference it made in comparison to the first two workshops (in Philadelphia and Utrecht) was striking. Both Munich groups were quite productive when it came to making basic rules for regulating GEHB. Unlike in Philadelphia I had not issued the request to come up with a specific number of rules and unlike in Philadelphia I had limited the number of participants to a maximum of 8 so that it would not be necessary to split up in subgroups for producing the rules (the main reason for holding two workshops in Munich). In each of the two groups, I had the role of the neutral moderator who also wrote the minutes while the discussion was going on. The participants could see the status of the draft at all points in time on the screen via a projector. The groups then approved the final versions be-
low, which also explains most of the roughness in language and content but makes the documents very authentic as well. (The original texts were in German, the translation was made by me).

Basic Ethical Rules for the Regulation of
„Genetic Enhancement of the Human Brain”
Considerations of a Workshop at the
Philosophy Department of the University of Munich
January 13th, 2007

We do NOT want A TOTAL BAN on germline interventions for reasons of principle reasons

- The technology should be applicable in those cases in which the genetic predisposition prevents an adequate living condition
- What is an „adequate living condition“ and what isn’t is a matter of societal definition
- However, there has to be a clear connection between genetic predisposition and disease. A relatively certain example is the Huntington disease where the connection between genetic endowment and disease and between disease and limited quality of life is beyond doubt.

We also do NOT want TOTAL LIBERTY to perform germline interventions – neither for the parents nor for the state.

The reason for this position is that we favour a general prohibition of instrumentalization and an obligation to protect human dignity

- Should there be a positive obligation to perform a germline intervention in case of a clear connection between a specific genetic endowment and the quality of life?

- No, germline interventions should only be optional, nor should there be any obligation for the parents to make a decision in favour of it. (There was no unity of opinion in the group, since some members of the group pointed out that parents are also obligated to give medical help in cases where the proper therapy needed is not a germline intervention but something else.)
Areas that need to be regulated

- Security standards = acceptable failure ratio/ acceptable technology risk (I'm not entirely clear on what this means, maybe you should add a few words of clarification)
- Limitation to clearly medical indications – what this means precisely is a matter of the current status of the research (not sure I get this either)

Other conditions under which we would allow GEHB

- A positive list of conditions was rejected after lengthy discussion and not all members of the group were convinced after the decision was made.
- The intention of the initiator has to be the best interest of the person whose DNA is being manipulated and not the interest of the initiator.
- Germline intervention has to be a „last resort,“ i.e., it should only be used when no other medical treatment has worked or makes sense.

Circumstances under which we would not allow GEHB

- All cases except the ones allowed above.
- All cases where unborn life has to protected from poor decisions of the parents

Basic Ethical Rules for the Regulation of „Genetic Enhancement of the Human Brain“

Considerations of a Workshop at the Philosophy Department of the Ludwig Maximilan University, Munich, January 27th, 2007

Should there be a total ban of germline interventions? NO

The group discussed a total ban before deciding against it and considered the following arguments in favor of a total ban:

- A germline intervention is irreversible
- The following generations would also be genetically determined by the intervention
- Maybe human dignity also means the right to DNA that has not been manipulated by other human beings?
Is the human DNA „holy“ and untouchable? NO

Some had reservations, but in the end the group decided anonymously that this is not the case. Human DNA is not untouchable as a matter of principle.

The approval of germline interventions should follow strict rules, though.

Conditions for the approval of germline interventions:

- Only for therapeutic purposes
- Only when a success of the intervention is highly likely based on prior research. (The requirements for clinical tests should be higher than in the case of pharmaceutical products since the consequences of germline modifications are more long lasting)
- Only when there is no other possibility of treatment with realistic prospects of success.
- Parents who want to initiate a germline modification have to have a (high) level of minimum knowledge that that they also have to prove.
  - There should be information campaigns of the government
  - Parents have an obligation to actively obtain information
  - Medical doctors have an obligation to actively provide information.

Delineation between therapy and enhancement:

- Therapy means the pulling up to the average norm or to a status of almost the norm.
- What is the norm is by nature variable, which also means being variable all the time.
- The definition of the norm is the result of a societal evaluation that has to be updated on a regular basis!

Who decides on the norm?

- Above all, a national ethics commission.
  - This commission should be staffed proportionally with all the relevant forces of society.
The members of the commission should be nominated by parliament or other government body, but the parties affected by the technology should also be represented (e.g., the parents).

The control of the qualification of the members of the national ethics commission has to be assured and could be a problem.

**The role of the parents:**

- The parents should have decision-making leeway within a normal range
- The parents have the right to make the final decision on a germline intervention in those cases in which traits are underneath or above the normal range as defined by the ethics commission.
- The ethics commission defines the normal range. In case of body height this could mean for example:
  - „Within the range of 1.50 m to 2.00 m parents are not allowed to manipulate the genetic codes for body height because it lies within the range of what is normal."
  - „Outside of this range parents are allowed to initiate a germline intervention to heal it but they do not have to."

- The government has to follow up the work of the national ethics commission with timely legislation.
- Government authorities and medical staff have an inferior role and should not be entitled to participate in the ethical decision-making.

**Should certain germline interventions be obligatory?**

- NO, in principle there should be no obligation to treat genetic diseases, there should only be appeals to the sense of responsibility of the parents.

The problem of data protection: should general genetic screenings be allowed? Or even obligatory?

- NO, there should be no force or obligation to do genetic screening, all other solutions entail too many potential political dangers in themselves (by infringing on civil rights)
- The right not to know about a genetic weakness shall prevail, even when children have to bear the negative consequences.
• There should be a recommendation to do an anonymous genetic screening if a risk is known and therapy for the problem is available.

What I find to be at the same time interesting but also a reason for further investigation is the fact that both groups came to very similar conclusions. For example:

• Both groups came to the conclusion that a total ban of germline interventions is not justifiable
• Both groups also said that it should only be allowed for therapeutic purposes and not for “pure enhancement”
• Both groups (implicitly or explicitly) declared some kind of strict control of the parents’ freedom to be of paramount importance.

At this point one can only speculate about the possible reasons for this striking similarity:

• Were the participants biased in their ethical decisions by what they had heard in the presentation beforehand?
• Did the similarity among the participants’ views lie in the similarity among the participants themselves? They all came from the same urban area, were all attracted by the university website, all had a strong interest in science, etc.
• Or, on the contrary, do the ethical decisions defined by the participants represent what is in fact the mainstream thinking in all Western countries right now, making this a representative outcome?

9.5. Conclusions Derived from the Empirical Test Workshops

9.5.1. Empirical Research in Asia After All?

One of the hypotheses for choosing workshop locations exclusively in Western countries was the belief that at least the secular ethical arguments for and against GEHB are universal. In particular, I started out with the belief that doing a workshop in Asia would most likely not bring any new aspects and would therefore not be worth the investment to do an empirical testing workshop there.
Even though the arguments leading to this hypothesis (see above 10.3.3.) are still as valid after the four workshops as before, I must admit that the results of the three sessions on biopolitical decision-making that took place (one in Philadelphia and two in Munich) make me hesitate a bit. All the working groups had great doubts about allowing parents to carry out germline interventions as a means of forming their own children. They had to be reminded that parents form their children in many other, non-genetic ways without us having any problems with that. All the working groups finally came to the conclusion that germline interventions should be allowed for therapeutic purposes, but only with strict control. All of the working groups also tried to push aside the fundamental questions concerning therapy versus enhancement to some extent, which I interpret as an attempt to find an easy way out of the dilemma of rationally coming to a conclusion that the more deeply rooted emotions still reject. But still, all of the working groups came to these conclusions relatively calmly that did not give the feeling of a heated debate going on.

So are these positions really as universal as it seems? Would people in Asia - who are outside the geographic area where the special role of humanity as the species created by God in a separate act - also have all the profound fundamental doubts on whether the germline might be something untouchable? Would Asians spend an equal amount of time discussing the value of human nature and would they impose equally rigid restrictions on using GEHB technologies? Would people in Asia be less afraid of the inherent „arrogance“ of pure enhancement and, thus come up with different biopolitical solutions?

Admittedly, these questions are pure speculation, but the relatively one-dimensional solutions found by the two working groups in Philadelphia and the two in Munich (who knew nothing about the results of the other groups) present a challenge to find out more about the underlying attitudes rather than a reason to be satisfied with this seemingly harmonious majority. The next logical step would be to check whether this streamlined clarity of ethical positions only exists in the Western world or also outside of it. Ideally, this research would have to be conducted outside of Christian-Islamic territory. This brings the idea of empirical tests in Asia back onto the table. But to be valid, these tests would have to consist of several tests to gain a glimpse of the attitudes on a continent with a population of some 2.5 billion people.
9.5.2.  **The Agenda is Complete, but this is not the Crucial Point in Biopolitics of the Future**

As already pointed out above (see chapter 10.4.1.), all of the empirical tests of the agenda showed that it is complete in the sense that no arguments arose that are not contained in this book. Thus it is reasonable to conclude that at this point in time, in the year 2007, there are no other arguments for and against GEHB than the ones in this book. The categorization developed in this book was a logical one for all participants of the workshops with the caveat that many of them would have preferred a different balance or sequence of the presentation. So the problems of having to cope with completely new views or arguments that cannot be found in any piece of published literature did not exist, but instead other problems turned out to be the focal point for a more or less successful biopolitical work, i.e., for the making of well founded ethical decisions. I will describe these problems on the following pages under the title „biopolitical dilemmas,” even though they are probably dilemmas of high-tech democracies in general.

9.5.3.  **Biopolitical Dilemmas**

**The Time limit versus Thoroughness Dilemma**

All four workshops were designed to last for one day. Even though the workshops were short relative to the scope of material land were well marketed by highly respected persons or institutions, – so in brief: even though the conditions were excellent - the total number of participants that could be attracted was 34. Around 80% of them came from a relevant field with the appropriate educational or professional background that made them willing to invest the roughly 10 hours needed for participating. Thus the dominant motivating factor for participating was not to be a good and well-informed citizen.

What is the conclusion from all this? Requesting from people in the general population to spend more than 10 hours on this topic is probably asking a lot. Most people most likely have even less time available, unless there is some professional or direct private reason to become properly informed.
This, in turn, leads to the sobering hypothesis that mass education on topics like GEHB is probably only possible either in (obligatory) schools for the very young up to adulthood or via the mass media. While schools can only be part of a long term strategy, the media have their own laws and rules of operation that one would have to adapt to. One would have to make the topic more suspenseful, for example, by exaggerating the technology forecasts (like: „GEHB will change all of our kids within the next generation“) or by exaggerating the inherent dangers of it. Or one has to be prepared to boil down the basic content of the discussion about the ethics of GEHB to a 20-second statement that a well-marketed and thus well known and well-respected personality can communicate to the general population via the electronic media.

In summary: due to the small time budget that people are generally willing to spend, the contents that can realistically be transported are very low on the thoroughness scale.

The Depth versus Width Dilemma

Resulting from the first dilemma is a second one that already constitutes a political choice, the choice between trying to reach only a few with somewhat thorough information on the one hand, and focusing on mass communication on the other hand. What looks like a commonplace statement in this abstract form is really the core of the discussion on democracy in modern high-tech societies. Is it better to create only a few well-informed experts who are theoretically able to come up with a well-considered and well-balanced biopolitical decision but whose integrity then has to be trusted in?
Or is it preferable to have a general population with a 5% knowledge base being lead by communicators like politicians and media stars in mass communication with sometimes chaotic procedures and suboptimal twists? Who should have the real decision-making powers about such complicated topics as GEHB and who can we trust most to come up with wise decisions? It is very interesting to observe that both working groups in Munich came up with biopolitical recommendations that deviated radically in one crucial point from the biopolitical solutions of the „expertocracy-establishment“ of the current German state. Neither the national ethics commission, let alone the top management of the country’s lawmaking authorities, would even remotely think of abolishing the position that the human DNA is untouchable, not even for healing genetic diseases. Is that a coincidence or is there an ethical conflict visible between „official members of the expertocratic class“ and „well-informed grassroots-thinkers“? Or are in reality the workshop participants the ones who were manipulated unintentionally? In particular for the participants of the two Munich workshops this cannot be completely excluded, leading to the third dilemma of biopolitics.

The Knowledge versus Autonomy Dilemma

As pointed out above, providing an agenda that is only a skeleton without any flesh attached to it is not a realistic approach for enabling people to make biopolitical decisions on GEHB. It is not realistic in terms of the time input that people are willing to invest. People expect from the workshop organizer not only a function as a neutral moderator of the discussion, but also see him as an expert on the subject and therefore expect some content input.

There are many difficult questions that arise when trying to define the limit between providing information and exerting influence:

- Should the views of transhumanists be mentioned, even though they are a minority view?
- Should the Vatican be quoted without pointing out the views of Judaism?
- Does the portrayal of potential negative side effects on 4 out of 47 slides constitute a focus on utilitarian arguments that influences the workshop participants in an improper way?
• Do the views of human nature and of Darwinian evolution really have the importance that was assumed when designing the workshop presentation? Is it an improper imposition of those assumptions to present this on the slides of the introductory presentation?

• Is it true what one of the workshop participants in Utrecht pointed out that portraying GEHB as a technology that is already being developed automatically blocks the participants' thoughts on how to prevent this development?

• Does the presentation of a total ban as a regulatory possibility confuse participants and prevent them from sufficiently considering the idea of a temporary ban?

The workshops that I conducted on GEHB put me in the situation of wanting to be as neutral as possible without influencing or pre-determining any decision to the greatest possible extent. I learned during those workshops that this is really an unusual position to be in, since normally presentations are made with the purpose to prove something or to convince the audience of something, to influence opinions and attitudes. If it is already so difficult to avoid the expertocratic advantage even if one wants to - then how tempting might it be to just practice expertocratic politics for people who have a desire to rule. If people ask for guidance and are eager to believe and follow an expert since this is not only convenient but the only chance to survive in an ever more complex world – how can we ever hope that they find their way without the subtle and implicit influence of experts?

I concluded that a certain degree of „expertocracy“ might be inevitable.

The Rationality – Intuition Dilemma

The approach taken in the workshops and the whole concept of this book is a purely rational approach. After collecting arguments concerning GEHB, I classified them, like one would classify a great variety of animals found in a yet undiscovered part of a jungle. I have tried to design a workshop program that confronts people with those pros and cons. The expectation of such an approach is that the workshop participants enter well equipped into a highly cognitive process and come out with a well founded, well structured decision.

This is the ideal way to go proceed with policy making. The attitudes of many people must be surveyed to determine the extent to which they over-
lap or conflict. The final step is to have an exchange of informed opinions to find a common position in a peaceful and democratic way.

But the reality of ethical decision-making is different and we have to recognize this and take this into account. Individuals may arrive at ethical decisions that they feel comfortable with in a much more efficient way when they use intuition rather than rational and cognitive thinking. To find out if this is true, one has to use many scenarios rather than abstract language. It would be interesting to find out in further research if a more scenario and intuition based workshop approach would lead to different results.

In any case, one of the results of this workshop series with its highly intellectual participants is that this kind of workshop design would probably not succeed with participants from the general population. This is particularly the case with a topic as dangerously close to the deeply rooted religious belief system of the Judeo-Christian culture. People would have to sort out their feelings before they could come up with any point of view. This would most likely also take much more time than a few hours of rational discussion in a workshop. It might takes days, weeks or maybe years in a slow process of piece by piece digesting information and prioritizing numerous examples. Is this why only a few of the workshop participants changed their opinion? Did they develop a slightly different opinion without realizing it or they would have answered differently if asked not immediately following the workshop but a day or a week later?

The suggested agenda of this book, thus, describes an ideal that humanity is probably not able to reach quickly. What is needed most urgently in dealing with GEHB from an ethical point of view at this point is, thus, a very large amount of time. Time to learn about the aspects of the issue piece by piece, time to talk and to listen to others, time to get used to certain thoughts or to realize that certain ideas are on second thought not as promising as they had seemed at first.

We can only hope that this large amount of time will be made available for people to come up with a sound ethical decision on something that is potentially as profound as GEHB.
EPILOGUE
„You have told us a lot about the many conflicting opinions of other people – but now please tell us what YOU think!“ This is the statement that I heard in one form or another many times during the workshops that I held.

Since it was my intention to provide a complete descriptive overview rather than a theory or new arguments, I did my best to avoid making any comments or introducing any bias when portraying the ethical positions on GEHB throughout this book and during the empirical workshops. This is the defined purpose of this book and I did my best to fulfill it.

But, of course, I do have an opinion on the issues that this book is about. When writing a book like this, it is for a person with intelligence probably close to impossible not to develop an opinion and not to develop preferences in favor of one of the described ethical arguments while at the same time disliking and rejecting others. I will take the freedom to use the last few pages of this book to openly give my opinion.

As I have explained lengthily, I believe that the most efficient way of communicating an ethical opinion on GEHB might be to describe the set of ethical rules that one believes should be at the core of any future legislation or any future code of conduct concerning GEHB. So I will follow this belief and go through the same biopolitical exercise as an individual that the workshop participants had to go through as small groups.

After some consideration I filtered out the following 10 principles that I personally on the basis of my personal value system believe should be the moral foundation of how to deal with GEHB in the long term future.

1) Religious Freedom

No enhancement intervention including germline modifications should be prohibited by law or other rules and regulations based on purely theological arguments. It should be part of the basic human right of religious freedom to not withdraw or impose options of germline interventions based on religious arguments alone.

2.) No Absolute and Total Ban

A total ban of any form of neuro-enhancement including genetic enhancement is neither realistic due to the decentralized international structures of legislation on these issues, nor would this make any sense from an ethical
point of view since their might be technologies that advance human well being. This principle applies in particular to a total ban on research since research is supposed to bring differentiation and reason to the judgment on these genetic enhancement technologies. However, there has to be a temporary ban for the USE of technologies that are not sufficiently researched in their side effects.

3.) Therapy should have Priority over Enhancement

When making political decisions on allocating resources such as research funding, priority should be given to improve the biomedical situation of people who are endowed with qualities that are below average. Therapy is the modification of a status that is below average when it comes to a desirable trait. This leaves the difficult question open how a desirable trait is defined..

4.) The „Best-in-Class-Approach” should have Priority over „Above–Natural” Enhancements

When making political decisions on the allocation of resources, the next important priority following therapeutic methods should be to develop enhancement methods that would allow individuals to obtain the „best” feature that can be found in any other human individual. This would also mean that it should be allowed and in specific cases even fostered to eliminate natural disadvantages that some individuals have over others. Developing features that cannot be found in any other human individual and that are in this sense „above-natural”, however, should have the lowest priority and their necessity should be scrutinized before giving permission to use them.

5.) Distributive Justice is Important but must be regulated in a general Framework of Biomedical Ethics

The availability of enhancement technologies to those not capable of purchasing them must be regulated in the framework of general health care and social policies. The same is true for research and development funding and its priority setting. A specific regulation for genetic enhancement technologies that are fundamentally different to, say, rules on access to pharmaceuticals, does not currently seem necessary.
6.) When in doubt, tolerance is best

We as a society need to develop a tolerant view of how we define „human nature” and leave some of the developments to the free decisions of individual parents. The general principle should be: when in doubt, tolerate!

Not only are societies and their political institutions potential decision makers on questions of genetic enhancement, but especially parents-to-be. After all, any decision to apply enhancement technologies is part of a reproductive decision. This grassroots oriented approach is part of the basic values of any liberal society. It should not be changed completely unless some technology or type of enhancement is found to be harmful and there is a social consensus on this judgment.

7.) Technology Safety is crucial but should not be prohibitive

When germline modifications are initiated by human beings, those persons who make and implement the decisions them bear great responsibility. If germline modifications go wrong, the destruction of the embryo is not the only negative scenario, the other and much graver negative scenario is lifelong suffering of the „enhanced” child. Therefore, only those interventions should be permissible that have a very low failure rate according to independent, neutral experts. Who shall be deemed to be an independent, neutral expert and what shall be deemed to be an acceptable failure rate must be decided in a democratic decision-making procedure in accordance with standard ethics rules. In particular, it is important that technology safety not be determined solely on the basis of animal experiments, since these are only a rough indicator of the effect on humans. Also, an enhanced individual must grow up to be an adult in good health in order to determine whether the intervention technology used turned out to be a success or not, i.e., at least to age 17. However, since nature creates undesired mutations in a few hundred cases per 10,000, an estimated failure rate should not be required to be less than one in 10,000 otherwise this could mean the introduction of ideology-based bans of genetic enhancement technologies under the false guise of „technology safety.“ This rule should even apply in cases of pure enhancement (i.e., without any therapeutic intentions).

8.) Autonomy of the Child has Priority whenever this is possible

By their very nature germline modifications as we imagine them today require that parents act as a surrogate decision maker, thereby automatically limiting the child’s autonomy. However, every individual’s autonomy has a
high value and should not be limited or overruled unless there is no alternative. Alternatives to germline interventions might be somatic gene therapies, neuro-enhancement through psychotropic drugs, or implants, all of which can be decided upon by the adult individual. Germline interventions should only be the methods of choice when they have unique, clear and important advantages over such other methods for achieving the same goal.

9.) Limits to Parental Liberty

Society should set limits to parental liberty in a democratic process especially concerning enhancements that affect social behavior.

Even though the basic freedom of parents to shape their offspring should remain in place, there has always been interference of society on matters of shaping the next generation. This mix of societal intervention and parental liberty should also be applied to questions of genetic enhancement. In particular when genetic modifications result in consequences for the social behavior of future human beings, the decision on any enhancement intervention should be mainly subject to a democratic decision of society as a whole rather than the decision of individual parents or families alone. Societies should make it obligatory for parents to obtain permission for each single GEHB intervention, at least in the early phase of the existence of the technology. Since the technology is very complex, societies will probably be forced to apply an „intentionalist“ approach when deciding about this single case permission, which would entail a representative of the society making a judgment on the intentions of the future parents who want to apply genetic enhancement technologies rather than trying a judgment of the outcome of the intervention and whether it is desirable or not. Only if the best interest of the future child is in the focus of the parent’s intention, the permission to germ line modifications should be considered at all.

10.) The Obligation of Society

Societies have an obligation to educate future parents about the inherent possibilities and dangers of genetic enhancement in an objective way, and future parents have an obligation to learn.

Genetic enhancement appears to be a very complex technology thus far. The biological structure of the human brain, how it is determined by the genetic setup of a human individual and how, in turn, it influences the feeling and the behavior of a human being seems to be even more complex. Thus, when
genetic alterations targeting the human brain are implemented, utmost caution and careful deliberation are essential for avoiding harm to individuals and society as a whole. Two parties are involved in assuring a maximum fulfillment of this principle: society and its institutions on the one hand and the parents-to-be on the other hand. A thorough education program should start in school at all levels and should end in an obligatory training program for parents who wish to use genetic enhancement for their future child.

The main concern and focus of our efforts should not be the development of the technology of genetic enhancement of the human brain itself, but rather the development of the future users of this upcoming technology. Not the quality of the technology itself, but the qualification of the potential users of the technology – which could at some point in the future mean all of our great-grandchildren - is the crucial issue and real reason for concern. In this sense the last two of the principles that I defined in this epilogue are really the crucial ones: if we manage to increase our qualification as technology users we have no reason to fear the changes and problems that any technology might bring, because then we will also learn to abstain from developments that are too ambitious for us to handle. We will be patient enough to wait until the right time in the development of knowledge and intuitive judgment has come.

Let me exclaim my fervent wish:

MAY FUTURE GENERATIONS
DEVELOP THE WISDOM THAT THEY NEED
IN DEALING WITH TECHNOLOGIES
FOR THE GENETIC ENHANCEMENT
OF THE HUMAN BRAIN!
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