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INTERVENING IN HUMAN GENES – OR NOT? A BIOETHICAL ISSUE ON THE BORDER WITH SCIENCE FICTION

Abstract

This article will try to illustrate and discuss the bioethical problem of genetic engineering. Science fiction movies were used to open the discussion on the ethical and bioethical levels. Namely, with the project, Human Genome, reading and editing genetic maps became possible. This discovery enhanced our fantasies about curing any disease, but it has also shown our fears—the fear of misusing this discovery or using it for eugenical purposes. Suppose eugenics would become the real future of this discovery, then it could bring us inevitable problems that we need to anticipate from now and try to discuss them. We use movies to show the possible following times. Some of the well-known bioethicists emphasize the need to investigate the upcoming. They consider that we have to create regulations for using gene editing discovery before things go out of control. According to them, we need to prevent forthcoming events we might not be able to control.

Keywords: genetics, eugenics, liberal eugenics, bioethics, ethics, responsibility.

Introduction: An Imaginative Future of a Present Discovery

“Why satisfied with ordinary when you can choose perfection? Choose Perfection”¹ (*Allegiant*, 2016: 33rd minute) - a sentence that illustrates our wishes and hopes regarding genetic modifications. We are hoping to erase our shortcomings. Since this has been a discovery capable of altering us, we must also consider the possible fate of using available tools for gene editing. Genetic engineering has become an actual bioethical question since the possibility of misusing the tools appeared. Today we have tools to alter the human genome, which we strive to improve. We also have some examples of such interventions. When Huxley wrote his *Brave New World*, this was just science fiction, a very distant future, or even a fantasy. Now, the border between science fiction and reality is starting to fade. The thinning of this border allows us to use science fiction to present the problem understandably and excitingly. This article will try to show how the discovery of gene editing is used in movies. Then we use future sceneries to encourage bioethical debate on this issue. Hans Jonas mentioned *Heuristics of fear* (1984: 26-27) when he projected future problems for humanity. The ethics of the future, according to him, has the “duty to visualize the long-range effects of the technological enterprise” (Ibid.: 27). In our research, we will do the same, present this fear by using modern Science Fiction movies. We will create thought experiments to show the growing importance of asking questions about genetic modifications in humans and point out how important it is to think about the possible fearful consequences of massive usage of this scientific discovery.

The opening statement belongs to the third sequel of the *Divergent* trilogy. The third part, *Allegiant*, contains scenes inspired by the discovery of genetic modifications, which we believe can lead us into a bioethical debate. The city of Chicago, which is in the center of this movie, was thought to be the only city on Earth that was not destroyed by the war. In its peace and independence, this city, surrounded by a wall, lasted for two hundred years, without contact with the surrounding world. Citizens of Chicago believed that they were the only ones who had survived the apocalypse. People had lived in peace for two centuries in a system of five factions. Every citizen of Chicago had to fit into one. When they were old enough, they chose to be peaceful, honest, selfless, fearless, or intelligent. The problem of such a society began with the appearance of different ones,

1 Movie info available at: <https://www.imdb.com/title/tt3410834/> Commercial going in the back of the video which is used to introduce the citizens of Chicago with the mission of outside world. This commercial is telling the story of how genetical perfection can be bought. Movie is based on the series of novels with the same name, written by American Novelist Veronica Roth. More information about the trilogy can be obtained on the following address: [https://en.wikipedia.org/wiki/Divergent_\(book_series\)](https://en.wikipedia.org/wiki/Divergent_(book_series))

who possessed all five qualities: honesty, peacefulness, fearlessness, selfless, and intelligence, and that could belong to every faction, but they actually did not belong to any of them. Residents of Chicago were not aware of the fact that they were part of a scientific experiment until they discovered the existence of more people behind the wall. When they met the outside people, they found out they were a part of the experiment, monitored by the outside world. Chicagoans were not informed about their participation in the experiment, and they were not able to give informed consent. (Allegiant, 2016) The following example is the illustration of the scene from the movie, in which they finally discover that they are part of an experiment:

“Hello, and welcome to the Genetic Welfare Bureau. In the first part of the 21st century, scientists have found a way to first map and then edit human genes. But what started as an attempt to erase human flaws has almost destroyed all of humanity. Genetic modification has deepened unrest among humans. The more determined they became: the world began to fall apart until humanity crossed the line from which there is no return. In the ashes of civilization, a small group of genetically unmodified” (“genetically pure”) “individuals” has established a bureau for genetic well-being here at Chicago’s O’Hare Airport. Our mission is to observe a great experiment in order to purify the human genome. That experiment is the city of Chicago. Your participation in the work of the bureau means that you are now the guardians of the future.” (Allegiant, 2016: 33-34 minutes).

In this movie, we have a future scenario on the topic of genetic engineering. In this future, scientists are trying to remove the modifications from the genome by experimenting on people locked in the city and surrounded by a big wall. Subjects are constantly observed in order to locate those who behave differently, whose genome started to purify. They were called *clean*, and when compared to them, other people were considered damaged. This difference indicates the fear of what could happen if humanity was divided into two genetically different halves. Today’s scientists believe this division into two types of people is the possible future of this discovery. Then the question may appear: Who will be considered a better, modified, or non-modified person?

Discovering Ethical Questions Beyond Imagination: Contemporary Bioethical Views

The sentence about the scientists of the 21st century who had managed to map and change the genome refers to *The Human Genome Project*, which served as

the inspiration for the thought experiments in this movie. “The Human Genome Project (HGP) was one of the incredible feats of exploration in history rather than an outward exploration of the planet or the cosmos. The HGP was an inward voyage of discovery led by an international team of researchers looking to sequence and map all of the genes (together known as the genome) of members of our species, *Homo sapiens*. Completed in April 2003, the HGP gave us the ability, for the first time, to read nature’s complete genetic blueprint for building a human being.”²

The discovery of the double-stranded DNA occurred when James Watson and Francis Crick’s discovery appeared in the British journal *Nature* on 25 April 1953, where they published their three-dimensional model of the structure of DNA molecules. Since then, there have been many discoveries in genetics. In 1957, it was discovered that the arrangement of the bases on the DNA chain represents the code (Rinčić 2007: 22), and the bases are combined and thus transmitted hereditary information. Shortly after this discovery, the first maps of human genes were made. Numerous studies were being conducted in this field during the seventies, but we can freely say that the real history of genetic engineering began with the *Human Genome Project*. This project started in Santa Cruz in the United States in 1985, and it is still active today. The task of the project is to create a complete map of the human genome.

This project not only served as the inspiration for the film *Allegiant* but also attracted bioethicists’ attention. Namely, the HGP research program in ethical and social issues (Ethical Legal Social Issues ELSI) was established.³ ELSI is the world’s largest bioethics program that aims to research ethical, legal, and social issues related to the application of discoveries made in research within the HGP⁴. This program is a way for current bioethics to study the possible consequences of this discovery. “Genetic technology in medicine is in a way defined as a field of special importance for bioethics, to which, in addition to the real foundations, the mass media and popular scientific literature have contributed.” (Rinčić, 2007: 63)

This discovery is accompanied by great expectations to turn genetics into an interpreter of society quickly. The eugenics that can occur here is the cultivation

2 National Human Genome Research Institute, The Human Genome Project.

<https://www.genome.gov/human-genome-project> (Date of access: 14.08.2021.)

3 More information on the ethical and social background of this project can be found on the website of the Institute for Human Genome Research Institute. *Ethical, Legal and Social Implications Research Program* <https://www.genome.gov/Funded-Programs-Projects/ELSI-Research-Program-ethical-legal-social-implications> (Date of access: 14.08.2021.)

4 *Ethical, Legal and Social Implications, ELSI*, Los Alamos Science 20 1992 <https://permalink.lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-UR-92-2620-11> (Date of access: 14.08.2021.)

of new generations according to the genetically desired image of humanity. The advertisement in the background implied precisely that this genetic perfection could be bought. “Why settle for the ordinary when you can choose perfection, Choose Perflexia.”⁵ In this possibility actually lies the root of fear for the future, because if the wealthy ones could buy such correction, it could bring enhancement, which will divide the people into two groups.

Francis Fukuyama (2002: 157) even believes that the difference will be biological as well as social and that there will be no more genetic lottery. The ones who will be able to provide themselves with access to tools for enhancement will feel different from the others, and they will be different. “They will look, think, act, and perhaps even feel differently from those who were not similarly chosen and may come in time to think of themselves as different kinds of creatures. They may, in short, feel themselves to be aristocrats, and unlike aristocrats of old, their claim to better birth will be rooted in nature and not convention” (Ibid.: 157) This can become a colossal problem, according to this author.

Besides this, other problems also worry bioethical minds, like responsibility towards the future generation and its right to inherit an unmodified genetic structure; Whether the genome can be purified from genetic modification and how many inherited generations it takes? That is why the Genetic Welfare Bureau from the movie is creating the city of Chicago as an experiment. According to Iva Rinčić (2007: 42), the Heredity of genetic modification is both a bioethical and a medical problem that can affect future generations. Intervention into the cell itself brings changes at the embryo level, according to Jürgen Habermas (2003: 18). The genetic material is most easily subject to modifications⁶, and undesirable genes can be removed during this period. If it intervenes in the germ cells, it impacts the entire hereditary material of all future generations. Our thought experiment shows that then the reverse process of correcting this inherited genetic material is difficult and time-consuming, if not impossible. The *Chicago* experiment had one successful individual in two hundred years. Are we ready to wait for so long to correct mistakes, which we can still prevent today by adequately regulating the application of new genetic technology? Although Habermas (2003: 18) claims he is not convinced that moral reasons can prevent

5 Compare with the mission experiment from the beginning of footnote 1 and 4.

6 It is precisely this possibility of fertilization outside the mother’s body that has made human embryos available to research at the earliest stage. Stem cell experiments and research have become possible. Pre-implantation diagnostics make it possible for embryos in the eight-cell stage to undergo a precautionary genetic test. The procedure is first offered to parents who would like to avoid hereditary diseases.

progress in this field, however, he also points to the regulation of this discovery that is already needed today. (Ibid.: 12)

Here we can find one hidden question, although not less bioethically important. It is a matter of experimenting on people who are not familiar with being part of the experiment. This is an old bioethical question that appeared in the early stages of bioethics when it developed as part of medical ethics. In this context of the future, it is wholly neglected to eliminate the consequences of the intervention, where the participants' autonomy in the experiment was completely put aside for the more significant benefit.⁷ (Eterović, 2017: 29)

Some of these questions we found in the movie *Aliagent* (2016) have been bioethical issues since its inception, such as responsibility and personality autonomy questions in the experiment. Some of these will become problems in the future if the application of genetic engineering to humans really makes the gap between modified and unmodified humans bigger and if such gap becomes widespread somehow. Problems will arise. For example, stigmatization and discrimination based on a faulty genetic record will not be a matter of science fiction but quite a possible reality.

When we look at the present and early bioethics from the science fiction point of view, we can think about the responsibility for future generations from the genetic engineering point of view; we can see future science fiction projections of such interventions. On the one hand, with this discovery, we may have dangerous knowledge in our hands that could lead us to living conditions

7 (*Kant and Bioethics* Translations made by: Authors.) Such problems of the subjects who were in the experiment without knowledge about it were dealt with by early bioethics, namely with the progress of medicine during the past century, and it appeared through such experiments. Early bioethics argued that participants in the experiment must give their consent. These experiments are known as bioethical scandals because they did not contain any consent or information of the participants in the experiment. Experiments, such as the 1963 Jewish Chronic Disease Hospital in which people treated at the hospital were injected with live cancer cells to investigate the disease, and Willowbrook State School in which students, who had a reduced ability to reason, were being injected with the virus in order to monitor the development of antibodies and development of hepatitis in a healthy body for more than a decade, were interrupted with great public noise. In the first experiment, the participants were not even informed about the experiment, while in the second, the students of the school had an IQ of about 20, so it is debatable what kind of consent they could give. Some informations about these problems can be found Barron H. Lerner's article "Sins of Omission — Cancer Research without Informed Consent", *The New England Journal of Medicine* 351, no 7, 2004. Pg.629. Also at following websites: <http://willowbrookstateschool.blogspot.com/p/history.html>, https://www.silive.com/news/2017/01/the_horrors_of_willowbrook_sta.html, and in the Documentary *Abolish Willowbrook Hospital*, Available at: <https://www.youtube.com/watch?v=bpVEjzO6Dd0>

such as those in the movie *Aliagiant* (2016) the city of Chicago, namely in a post-apocalyptic world, in which the values we know are completely changed.

Some authors think that it might even be possible to create transgenic organisms⁸ crossing the genes of one species with another in a way that evolution itself can not. (Cooley, Dennis, 2010: 128) While on the other hand, we have the possibility of treating a previously to us inaccessible disease. As long as there is medical justification for specific procedures, they will be accepted. The beginning of the problem is the moment when the medical reasons are absent, and the practices continue. According to Habermas (2003: 25), there were many discussions on that topic, but none prevented the technique from progressing.

The fact that we are in the biotechnological age is indisputable; we are witnesses to the progress of science and technology on a daily basis. The application of technology in genetics is a kind of application of genetics itself, which affects almost every aspect of life. The progress of science, not only in this field, is a fact of today's age in which man, in such circumstances, should look back on the idea of their survival. As Van Rensselaer Potter (1971: 1-30) called it, bioethics as a science of survival needs to address survival even more deeply nowadays. The reason for this is that science has advanced rapidly in the first decades of the 21st century and is present in almost every aspect of human life.

That is why the current bioethics' task is to examine all the influences of such a discovery on humanity. "It should anticipate and consider all possible scenarios, even the worst ones" (Rinčić, 2007: 27), which could occur to our descendants. Its duty is to appeal to the legislature to avoid these possible unwanted scenarios by laws and ethical norms. This regulation problem is no longer an issue that affects the legislation of this or that state. This question is problematic for man since genetic engineering can lead to a wholly changed understanding of what man is. As for the attitudes toward pre-personal life, Habermas (2003: 26) believes that "Genetic manipulation could change the self-understanding of the species and can affect the self-descriptions under which we identify ourselves as human beings." (Habermas 2003: 42) In the context of genetic engineering, the responsibility should be on the entire population, and most of all on scientists (Rinčić, 2007: 46) because most genetic interventions are no longer just a matter of the individual. Still, they also affect the people in the environment. Since we are the population of people on the planet who are on the verge of making

8 The evolution argument's first variation, *Usurping Nature*, claims that researchers are overtaking evolution's role when they splice the genetic material from one species into that of another in a manner evolution cannot duplicate.

decisions that will reflect on the future, we have tremendous responsibility for the future. In our hands, we have a technological tool that can change our future. Is it not our responsibility for our future? Future bioethics should point out the need to legally regulate the application of these discoveries and create a strategy of what should be done if a science-fiction scenario realistically begins to unfold. Some authors would agree on this challenge to humans who bring this discovery to us (Sulston, Ferry: 2002). "The human genome project provides a unique illustration of choices faced by individual scientists by society as a whole." (Sulston, Ferry: 2002: 9).

Current bioethics and humanities could advocate those scientific discoveries such as genetic engineering not to be patented (Fukuyama: 185-186)⁹ because that reduces them to a product that can be bought. That is why it should appeal to scientists not to sell their discoveries as patents.¹⁰ (Sulston, Ferry: 2002: 9) As such, they can then be used for commercial purposes, which can lead back to research with the aim of increasing the profit obtained by mass production. Will this lead to gene sales? Will the scenario mentioned above become a reality? If such a scenario materializes and we can afford genetic intervention, the bioethics of the future must find a new methodology to combat the market eugenics that emerges with the commercialization of the application of this scientific discovery. Also, it will have to orientate itself toward discussions about the relationship between modified and unmodified.

Habermas believes that this technology is able to change the attitude towards human nature. Earlier, man could experiment with still life, and today they are able to intervene in the domain of the living and the diligent. Habermas refers

9 See, Fukuyama, *Our Posthuman Future*, 185-186: "It is only "theology, philosophy, or politics" that can establish the ends of science and the technology that science produces, and pronounce on whether those ends are good or bad. Scientists may help establish moral rules concerning their own conduct, but they do so not as scientists but as scientifically informed members of a broader political community. There are very many brilliant, dedicated, energetic, ethical, and thoughtful people within the community of research scientists and doctors working in the field of biomedicine. But their interests do not necessarily correspond to the public interest. Scientists are strongly driven by ambition, and often have pecuniary interests in a particular technology or medicine as well. Hence the question of what we do with biotechnology is a political issue that cannot be decided technocratically." Here we can see the need for research ethics which will try to prevent scientific ambitions and greed.

10 Motivated by a financial gain, hamstrung by sponsorship deals, or simply out of self-defence, many researchers trade their discoveries with the rest of community under the protection of patent law or commercial secrecy. In other hand there are still many who cling to the older ideas of science as they have raised their voices in protest at the way things are going. (Sulston, Ferry: 2002: 9)

here to Hans Jonas, who claims the irreversibility of the process of genetic interventions, considering it a process in which it is not known *whose power it is and over whom or over what*. (Habermas, 2003: 48) Earlier, this was known and manifested through man's mastery of technique. However, now technique interferes with the essential features of human nature, erasing the difference between a ruler and a subordinate, or in Habermas' words: grown and made.

Jonas's imperative of responsibility affects this area because, according to him (1984: 21), we have non-reciprocal responsibility towards future generations, and by gene editing, we are directly and indirectly altering our future generations, leaving them the possibility for mutual discrimination- and conflict. On the other side, there is the question of benefiting them by giving them a better genetic position than we have. Jonas (1984: 21) himself sees in this technology one big area of responsibility. He asks if we have the right to alter our descendants, which knowledge we have to do it, and who will decide about the image of future humanity.

Following in the footsteps of Jonas and his principle of responsibility, Rinčić (2007: 127) made an effort to provide us with a strategy bioethical responsibilities for the future that should indicate correct starting points to which it is not too late to return. "Because to be bioethically responsible means to be responsible at the same time towards the goal and the means, towards the individual and society, towards today and tomorrow, towards oneself and others, man and life in general." (Rinčić, 2007: 127)

When we know that the application of such technology is possible somehow, even though it is not yet widespread, we must consider what that application brings to humanity. Responsibility to future generations is directly affected by genetic technology. What if we just have a responsibility to future generations to give them the best possible starting position, better than we had? (Savulescu, 2008) However, our knowledge is limited in terms of how genes will be distributed in the next generations. Hence, there is also the question of what if even the slightest mistake was made during the intervention? Are we ready to bequeath it to our descendants? From the ethics of responsibility point of view, these would be sufficient reasons against genetic engineering. However, this discovery also shows its good side: to eradicate some inherited diseases with gene therapy.

So the problem is not in the discovery; the discovery can be used very humanely; the problem lies in the mistakes in the application that the society is inclined to make, which can have catastrophic consequences. The task of current

bioethics is to point out the possible consequences that would accompany decisions in this field. It also must make those who need to make decisions aware of the weight of those decisions. Therefore, current and future bioethics need to build a tool to help humanity cope with decisions it has not made yet.

Habermas believes that the conceptual boundary between preventing the birth of a seriously ill child and improving the hereditary trait of a eugenic decision is no longer sharp enough. Equating clinical action with manipulative procedures makes it easier for parents who want to participate in the selection of the child's characteristics, a *further step towards leveling out the substantial difference between positive and negative eugenics* (Habermas, 2003:51). Then there is a high possibility that there may be a need for intervention in the future even though all diseases have been eliminated. Then the conceptual problem of distinguishing prevention from eugenics becomes the subject of political legislation. (Ibid.: 33)

Fukuyama (2002: 182) also points out the importance of regulations over technology: "It has been long since anyone has proposed that what the world needs is more regulation. Regulation, particularly international regulation, is not something anyone should call for lightly." Significantly, the law is needed over pre-implantation diagnostics; to avoid its use for enhancement, this regulation should be done through institutions in every country and then through the extension of these institutions internationally.

"The sequence is now critical in a free and open system of biological information that will allow knowledge to increase and benefits to accrue faster than in any other way. It is our inclinable heritage. It is humanity's common threat." (Sulston, Ferry, 2002: 279) How then to observe this discovery in view of this statement?

The authors of this paper do not believe that the application of genetic technology should be banned entirely. Namely, like every discovery, it has a positive side. This is the reason why research in this field should be supported and interventions allowed to those who need it as a medical procedure. However, it is possible to turn it into liberal eugenics lies at this point, which is entirely humane. Because if genetic intervention became available and common, would not someone want to increase the abilities of their offspring genetically, would they not strive for "perfection"? The problem of eugenics arises when the application no longer has its medical reason but some other. When we move from eliminating flaws to perfecting the existing ones, society comes to the point where the value system begins to change. It can then happen that only perfection is valid.

“Issues such as genetic testing, gene therapy, improving the genetic composition of our body, choosing the characteristics of future offspring or creating banks of biological materials, are often misinterpreted, in the direction of exaggerating but also diminishing their importance. Public presentation of scientific discoveries and their applications, the reputation of the individuals or corporations involved, and commercial interests are elements that further raise tensions over the issue of genetic technology.“ (Rinčić 2007: 64)

Because science is able to change the human configuration, to eliminate disease before it implements embryo in the mother’s womb, it is therefore not far from the possibility of eugenic selection of characteristics and the emergence of a new society that could be based on genetic criteria that can cause deep discrimination on genetic grounds.

A suitable illustration of these problems of eugenics, is another thought experiment that represents the movie *Gattaca*¹¹. It is precisely an experiment on the indicated difference between genetically perfect and genetically imperfect, only in this context unmodified people, those who are flawed, unlike the previous thought experiment in which the modified ones were considered damaged. The thought experiment follows two parents who conceived their first child naturally and the second with the help of genetics. After the first child was sick and weak, they decided on genetics to create a healthy child with a predisposition for success. The following example from the movie illustrates the above:

Narrator: “Like many parents at the time, they wanted their next child to be born in a way that became natural, and they visited a geneticist who performed fertilization.” (Gattaca, 1997: 11-12 minutes)

Geneticist: “Your extracted egg, Mary, was fertilized with Antonin’s sperm. We sifted two healthy boys and two healthy girls. No predisposition to any disease. Let’s choose the most suitable candidate. Which gender do you want?”

Parents: “We want Vincent (*the first child*) to have a brother to play with.”

11 The events of movie Gattaca are put into dystopian future in which future kids are selected by the means of genetics to inherit the best qualities such kids are considered to be the only “Valid” members of society. The story is following young man Vincent who tries to succeed in an attempt to go to space, even if he is not the one of the genetically valid for this job, so he takes the identity of Jerome who is genetically perfect. The screen is written by Andrew Niccol who also directed the movie. It was nominated for Golden Globe in 1997. More info can be found: <https://www.imdb.com/title/tt0119177/> also on Wikipedia: <https://en.wikipedia.org/wiki/Gattaca>

Geneticist: “You made the baron eyes dark hair light complexion. I ruled out possible harmful conditions. Premature baldness, alcoholism, the propensity to violence, obesity.” (Nuffield Council on Bioethics 2002: 35).

Parents: “We didn’t want illness, yes, but ...” – “We would like to leave some things at risk.”

Geneticist: “Give your child the best start; we have enough imperfections. Your child does not need an extra burden. It’s still you. Simply the best of you. You can get pregnant a thousand times naturally and never get such results.” Here arises immediately the question: where are the limits of parental choice of undesirable traits of offspring? (Rinčić 2007: 34)

In this story, we had an example of pre-implantation diagnostics, which is one of the ways to intervene in the human genome. Before in vitro fertilization, the mentioned parents, in a conversation with a geneticist, determined the sex and characteristics of the future child. They removed the predispositions for any diseases, selected the hair and eyes color, and removed certain tendencies such as the tendency towards alcoholism and violence. This conversation regulates the characteristics of the future child, which is a eugenic endeavor.

People like Vincent,¹² who has no intervention, were considered unsuitable in that society; he, and unmodified people like him, could not get any important job. For that reason, Vincent takes Jerome’s identity, who is genetically perfect, and tries to realize his dream so covertly and go to space, because as Vincent, he would not get the opportunity to enter the research center Gattaca, much less lead a mission. Vincent tries to show that even the imperfect one can achieve the same as the perfect ones. This raises the question of how many people of the unmodified genome will really be able to measure up to people whose predispositions for all imperfections have been removed in the prenatal period, leaving room for only talents to manifest throughout life.

Creating a perfect human is a eugenic question and this discovery can create liberal eugenics, which will lead to division of people into perfect and imperfect. (Habermas: 2003: 23) Due to use and pre-implantation diagnostics, embryo

¹² Important for this experiment is the part from the beginning of the film Gattaca, which describes a man who is expected to be successful. “The most incredible event, Jerome Morrow, the first-class Navigator, will embark on a one-year mission to Titan, Saturn’s fourteenth month. This prestigious task is guaranteed to Jerome at birth. It has all the necessary values, the genetic relationship second in order. There is nothing astonishing about Jerome Moreau’s progress. Except that I’m not Jerome Morrow.” The problem we mentioned earlier is genetic discrimination. (Gattaca, 1997: 8-10 minutes)

research provokes strong reactions because they are perceived as the objectification of liberal eugenics coming to us. It would be able to move the line between the nature we are and the organic equipment we give ourselves. (Ibid.: 22)

Modern objections to genetic technology aim to implement new eugenics in which parents will be able to participate in the choice of the genetic structure of children. (Rinčić, 2007: 65) Moreover, that is precisely how we had the opportunity to see in the conversation of our two parents with the geneticist. However, there is an excellent possibility that such an intervention will not be available to all people. Only a tiny number will probably be able to afford it. “Genetic enhancement technology is likely to be expensive and involves some risk, but even if it were relatively cheap and safe, people who are poor and lacking in education would still fail to take advantage of it.” (Fukuyama, 2002: 159)

Nowadays, we are witnessing numerous examples of discrimination on various issues. The fear of the eugenic powers of genetic engineering is the fear that the already unstable equality between people will collapse deeply. “The inability to distribute equitably in access to them (genetic interventions) may jeopardize our understanding of the fundamental importance of equality for all people.” (Rinčić 2007: 71) In the *Chicago* experiment (Aliagent, 2016), the modified and unmodified people had no idea of equality. Moreover, the unmodified called themselves pure, against whom the modified were damaged. In the *Gattaca* experiment (Gattaca, 1997), the modified ones were valid, and the unmodified ones were invalid, which is reflected in the fact that these two groups have unequal opportunities in all spheres of life. Invalids cannot work in Gattaca. Here we can witness the use of genetic information as a criterion for employment, and if we want our child to work in Gattaca, we can make it possible with only a simple genetic intervention.

A novel by Aldous Huxley is a science fiction illustration of an imagined biotechnologically advanced society, an image of a eugenically constructed civilization, which is also an excellent example for presenting our problem. In this science fiction piece, we have a society of the future that grows embryos and modifies them, in the beginning, to belong to one of several castes to perform jobs that are suitable for that caste. The idea of parenthood is wholly eradicated; embryos are produced in factories and are grown until they grow up. A B Γ Δ and E people live parallel lives in that society. (Huxley, 1932: 20)¹³ Here we

13 Available at: <https://www.energyandstuff.org/sites/default/files/media/ebook/BraveNewWorld.pdf> “Alpha kids wear gray, they do a lot more than we do because they are so terribly smart. I really love being Beta, I really love it, because I don’t do that much. And we are still much

have the society of A B Γ Δ and E, with their genetic differences on the one side while on the other we have savages who are the touristic attraction. They do not participate in the New World because they have marriages and carry babies in their wombs, which is considered old-fashioned and degradative. Moreover, this is the reason they are called Savages.

This scenario is a possibility that we would definitely avoid. In terms of parents' choice of offspring characteristics or state eugenics policy, eugenics can produce irreparable consequences for humanity. The eugenic practice as the practice of one state is tied to the old type of eugenics, while the new one is set against it, which is reflected in the choice of the characteristics of the offspring, or as in our novel, the breeding of people. New eugenics is maintained through this choice of characteristics; it is one free-market eugenics. "While the old eugenics required constant selection for the reproduction of the healthy and the excretion of the sick, the new eugenics will, in principle, enable the transformation of all the unhealthy into healthy at the highest genetic level." (Fukuyama, 2002: 87) Unlike eugenic attempts in Germany over the past century, current eugenics may be a market rather than a state product. Since the market is very interested in such research, it can greatly influence the development of eugenic practice. Because the new eugenic practice, says Habermas (2003: 19), "leaves the choice of the goals of the intervention to change the characteristics of the individual preferences of market participants."

A journey like this can be a journey of no return. The fear of a new type of eugenics is justified since we have the technological tools to implement it. Maybe man will really be able to influence their evolution. The question now is how humanity will react to the application of genetic technology.

Some authors even suggest that the term eugenics be replaced by the word "breeding" due to the burden of the past. "In the future, we will likely be able to breed human beings much as we breed animals, only far more scientifically and effectively, by selecting which genes we pass on to our children. Breeding has no necessary connotations of state sponsorship, but it is appropriately suggestive of genetic engineering's dehumanizing potential" (Fukuyama 2002: 88); The result of genetic technology. The use of the term "breeding" is reminiscent of the Brave New World, in which "breeding" means that children are raised in a laboratory and spend time there growing up with educators, which in fact

better than Game and Delta. The range of children is very stupid, they all wear green and Delta children wear grey-olive. I really don't want to play with Delta kids. And the epsilons are even worse. What stupid people they are! They can't read or write." (Huxley, 1932: 20)

abolishes the institution of parenthood. Raising children in this way can stop implying parents as well as emotional attachment to them. Also, what is even more problematic is that we can aim at mass with breeding and that cultivation can be for different purposes. Thus, one Kant's question arises, whether this can lead to the ontological abolition of the idea of man as a purpose in itself. Habermas (2003: 20, 59) wonders whether all this research on embryos and pre-implantation selection of properties may not conflict with the dignity of life. "Can we freely dispose of human life for the purpose of selection? Are cultured people the authors of their lives?" Habermas (2003: 20, 59)

Huxley (1932: 20) gives a negative answer in the *Brave New World*. People are not autonomous but live by the standards of the eugenic world in which they find themselves without questioning it. They are aware that this world has bred them and unconditionally obey its laws which represent the laws of maintaining such a eugenic system in which subjectivity is reduced to a minimum.¹⁴ Some authors are in favor of this (Savulescu, 2012; Savulescu, Person, 2008) through the topic of moral improvement, address the question posed by Habermas on will individuals in the future lose their autonomy of life due to the use of genetic technology for improvement, because genetic modification can also serve as a method for ethical improvement, simple genetic abolition conflict behavior.¹⁵

Finally, we must touch on the early bioethics and imperative of responsibility offered by Hans Jonas following Kant's footsteps. In addition to genetic engineering, these imperatives can be applied to all human science and any other division. Jonas (1984: 11) believed that we are responsible for future generations to whom we must not endanger living conditions. His imperatives read: "Act so that the effects of your action are nor destructive of the future possibility of such life"; or simply: "Do not compromise the conditions for an indefinite continuation of humanity on earth"; or, again turned positive: "In your present

14 "Till at last the child's mind is these suggestions, and the sum of the suggestions is the child's mind. And not the child's mind only. The adult's mind too-all his life long. The mind that judges and desires and decides- made up of these suggestions. But all these suggestions are our suggestions!" The Director almost shouted in his triumph. "Suggestions from the State." (Huxley 1932, 21)

Available at: <https://www.energyandstuff.org/sites/default/files/media/ebook/BraveNewWorld.pdf>

15 Savulescu takes a positive attitude regarding every kind of improvement, he even considers that human improvement is a moral obligation. Along with certain thought experiments, we will try to show in the course of our work that their argumentation for improvement, as well as the idea that moral improvement should be imperative. English version available at: <http://www.gazeta-antropologia.es/wp-content/uploads/GA-32-2-07-Julian-Savulescu.pdf>.

choices, include the future wholeness of Man among the objects of your will. “ These imperatives affect our problem of regulating the application of genetic technology.

Jonas (1984: 27) also emphasized the importance of political responsibility for regulating the use of technology. Current bioethics should address the regulation of this technology more urgently in order to create a basis for the most humane use of this discovery. Habermas (2003: 19-22) tries to point out the need to regulate genetic engineering, as well as Fukuyama (2002: 185-186). These three authors are urging for international and worldwide legislation for using technology. Pointing out the need to regulate this field, calling for the dignity of human life, and Rinčić’s concept of bioethical responsibility are early and current bioethics attempts to find a tool to deal with this problem. The importance of a life worthy of living, a life in which we have moral feelings, is a characteristic that can be seen in all these authors. They are afraid that technologies could bring us the cold caused by genetic engineering and thus violate the dignity of human life, which is essential for the worthiness of living. This moral insensitivity could be a problem that will make our actions less human.

Conclusion

Following the fear of possible experimentation on embryos, the author of this paper asks the question: Is experimenting with embryos really experimenting with life at all? Will this lead to a Huxley future of human creation without parental involvement? This question crosses the boundaries of science fiction. However, since we have or will have the tools for something like that, this scenario should also not be bioethically neglected since bioethics should take into account all possible scenarios. Moreover, Habermas did not ignore it either, saying that the research on embryos worries people because it can be connected with the perspective of growing people. Thus, Jonas’s *Principle of Responsibility: An Attempt at an Ethics for Technological Civilization* and Potter’s *Bioethics: A Bridge to the Future* are examples of attempts by representatives of early bioethics to anticipate problems and try to provide a tool to solve them. Both of these authors saw that technological civilization needed a new ethic. They tried to anticipate possible problems that go along with science and technology, especially in the field of medicine, and in accordance with them, to offer an ethic that would try to make people aware of the problem and lead them to the right action. Potter’s bioethics and Jonas’ ethics of responsibility are examples

of early strategies for the future, as new and future bioethics need in the new circumstances. At the same time, we can see Habermas and Fukuyama as contemporary attempts to discuss these present and future problems.

All the presented science fiction scenarios contained most of the questions and dilemmas that we tried to point out, difficulties about where this process is going, and the mentioned science fiction predictions were not foreign to our authors either. Some even invoked the closeness of the possible consequences of this discovery to science fiction. Our attempt went the other way around. In our first thought experiment, we gave one science fiction situation, and then through researching the issues and problems it implies, we tried to show that it is not really far from reality. With another example, we wanted to point out the problem of pre-implant diagnostics and the possibility of creating a eugenic world. Most of the questions derived from these sci-fi interventions have found their place in the serious discussions by several authors of early and current bioethics that we have mentioned here. So these issues still stand in some way open and important for bioethical discussion. The author found the inspiration for finding them in science fiction to present as many possible bioethical scenarios as possible. Furthermore, we discussed these bioethical problems to see why there are essential questions about this discovery. Our ethics will change if our society divides into two halves by genetic criteria. *With this, two presumptions of our moral self-understanding, spelled out in terms of the ethics of the species, are at stake.* (Habermas 2003: 72)

References

1. *Allegiant* (2016) movie directed by Robert Schwentke, part of *Divergent* trilogy. Based on novel *Allegiant* (2013) by Veronica Roth.
2. Cooley, R. D (2010) *Technology, Transgenics and a Practical Moral Code*. New York: Springer Science+Business Media B.V.
3. Eterović, I. (2017) *Kant i Bioetika*. Zagreb: Pergamena.
4. Ethical, Legal and Social Implications Research Program <https://www.genome.gov/Funded-Programs-Projects/ELSI-Research-Program-ethical-legal-social-implications>
5. Ethical, Legal and Social Implications, ELSI, Los Alamos Science 20 1992 <https://permalink.lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-UR-92-2620-11> (accessed 14 August 2021)

6. Fukuyama F. (2002) *Our Posthuman Future: Consequences of the Biotechnology Revolution*. New York: Farrar Straus and Giroux.
7. *Gattaca* (1997), movie directed by Andrew Niccol.
8. Genetics and Human Behaviour London: Nuffield Council on Bioethics, (2002), <https://www.nuffieldbioethics.org/publications/genetics-and-behaviour> (Date of Accesses 14.2021)
9. Habermas, J. (2003) *The Future of Human Nature*. Cambridge Polity Press.
10. Hans, J (1984) *The Imperative of Responsibility: In Search of an Ethics for the Technological Age*. Chicago and London: The University of Chicago Press. <https://www.energyandstuff.org/sites/default/files/media/ebook/Brave-NewWorld.pdf> (Date of accesses 13.08.2021.)
11. Huxley, A. (1932) *A Brave New World*.
12. National Human Genome Research Institute, *The Human Genome Project*, <https://www.genome.gov/human-genome-project>
13. Potter, V.R. (1971) *Bioethics: Bridge to the Future*. Englewood Cliffs, NJ: Prentice-Hall.
14. Rinčić, I. (2007) *Bioetika i odgovornost u Genetici*. Zagreb: Pergamena
15. Savulescu J, Ingmar P, (2008) The Perils of Cognitive Enhancement and the Urgent Imperative to Enhance the Moral Character of Humanity. *Journal of Applied Philosophy*, vol. 25, no. 3.
16. Savulescu, J. (2012) Genetičke intervencije i Etika poboljšanja ljudi. In Rakić, V., Mladenović, I., Drezgić, R. (eds.) *Bioethics*, Beograd: Službeni Glasnik, Institut za filozofiju i društvenu teoriju. Original text available at: <http://www.gazeta-antropologia.es/wp-content/uploads/GA-32-2-07-Julian-Savulescu.pdf>. (accessed 12 August 2021)
17. Sulston, J. Ferry, G. (2002) *The Common Tread: A story of Science Politics Ethics and Human Genome*. Washington D.S.: The Joseph Henry Press.

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INTERVENIRATI U LJUDSKE GENE – ILI NE? BIOETIČKO PITANJE KOJE GRANIČI SA ZNANSTVENOM FANTASTIKOM

Sažetak

Ovaj članak će pokušati ilustrirati i raspravljati o bioetičkom problemu genetskog inženjeringa. Znanstvenofantastični filmovi korišteni su za otvaranje rasprave o etičkoj i bioetičkoj razini. Naime, projektom Ljudski genom postalo je moguće čitanje i uređivanje genetskih karata. Ovo otkriće poboljšalo je naše maštanje o liječenju bilo koje bolesti, ali je također pokazalo naše strahove – strah od zlouporabe ovog otkrića ili korištenja u eugeničke svrhe. Pretpostavimo da eugenika postane prava budućnost ovog otkrića, onda bi nam to moglo donijeti neizbježne probleme koje od sada moramo predvidjeti i pokušati o njima raspravljati. Filmove koristimo za prikazivanje moguće budućnosti. Neki od poznatih bioetičara naglašavaju potrebu za istraživanjem nadolazećeg. Smatraju da moramo stvoriti propise za korištenje otkrića uređivanja gena prije nego što stvari izmaknu kontroli. Prema njima, moramo spriječiti nadolazeće događaje koje možda nećemo moći kontrolirati.

Ključne riječi: genetika, eugenika, liberalna eugenika, bioetika, etika, odgovornost.