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A PHILOSOPHICAL ANALYSIS OF LIBERAL EUGENICS

PhD in Logic and Philosophy of Science

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0. INTRODUCTION

0.1. Science and philosophy of science

The doctrinal consensus that logical positivism has supposed and, lately, what it was called "the inherited conception of scientific theories" captured an unrepeatable moment in the history in the philosophy of science. Since the end of the 20s, with the Vienna Circle and its project of "unified science", until Thomas Kuhn's work *The Structure of Scientific Revolutions*, it is possible to claim, although some dissonant voices, like William Van Orman Quine and Karl Popper, that it was possible to identify a project that shared, at least, the same conception of the task of philosophy of science (a second normative order and justificationist task) as an organization of scientific theories, formed by a group of statements deductively organized. Science was a set of theories and products, and philosophy was only worried about the context related to their internal articulation and process of contrast. The fundamental features of scientific knowledge were objectivity, rationality, and neutrality. The unique values and factors to consider were internal or epistemological like truth or coherence, and they were mainly the focus of study for epistemology. All the factors that belonged to external context (discovery) like production of knowledge and knowledge itself (social, political, economic, cultural, and persona factors) were out of the philosophical analysis, they were the labor for sociology, history, or psychology.

Kuhn's work, quoted before, is considered the first point of inflection on the trajectory of that program. The historicist reaction to the traditional philosophy of science supposes the questioning about:

0. The distinction between the context of discovery and the context of justification, with express limitation regarding the exclusive pertinence of the second for giving an account of the scientific knowledge.
1. The existence of demarcation criteria that allows us to establish and distinguish what is science and what is not[1].
2. The possibility for distinguishing theoretical and empirical scope in a precise way, guaranteed by the existence of a basis of neutral analysis, which acts as an impartial referee in front of alternative hypothesis.
3. The progressive, and accumulative characteristic of the development of scientific knowledge, in the sense that it tends to the correct theory (this is, truer, more plausible, etc.) about the world.

This questioning is linked to a conception of the task of philosophy of science, and scientific theories: it should describe and explain the criteria that indeed work in scientific activity

[1] Science, unlike other forms of knowledge, possesses its own method, the scientific method, which guarantees a privileged access to world knowledge. The rules of this method, written in a precise mode, guarantees the correction of scientific practice at the same time, scientific rationality is unfolded around them.

because science is not only the set of its final products but also the theories. In this way, the philosophy of science has to focus on real scientific practice and also its history, because knowledge evolves and changes over time, and therefore it is necessary to consider dynamic aspects, internal and external, implied in its development. Historical research is crucial because we must consider the dynamic of the process in which scientific knowledge modifies and develops. In this sense, a key concept that formulates this proposal and it is indisputable in later approaches is the notion of *scientific community*, in which the subject or main agent in science is the community of scientists. This means that science does not depend directly on the labor or brilliance of individual scientists in that task, and objectivity is the result of intersubjectivity, and not a property derived from each one of them separately.

The new sociology of science, this is, the second point of inflection, analyses deeper the direction carried out by the historicist reaction: it is not only about what to study about in science in its historical context, but also to study it in its context, because it is always a social context. In this way, the idea that only internal relations of factors in scientific knowledge are susceptible to analysis and research is rejected[2]. External factors –social, political, economical- plays also an important role, and this implies again the necessity to study other aspects of the scientific activity that are not limited to the linguistic formulation of its products, nor the products themselves[3].

From the perspective of social studies of science, hypotheses, theories, and scientific judgment are not determined by elements like reality, logic, or method. The designed experiments, the analysis of the results, the scientific analysis itself, or even what could be considered as evidence depend on interpretation, negotiation, and controversies[4].

Lately, the social and cultural studies of science enriched this mosaic of perspectives and possible purposes of study for the philosophy of science, which supposed a greater consideration of its task, or allowed to speak about "philosophy of wide science"[5]. This points out the characteristic of social and human activity of science as one subsystem that we might

[2] In the scope of history of science, the work T*he Methodology of Scientific Research Programmes*, published by Lakatos in 1978, makes a distinction between external and internal history. He retakes in this way not only the distinction between external and internal factors, established by classical philosophy of science, but also the primacy established to the formers when they claims that history of science must only focus on internal history. From this point of view, moreover, sociology and the allusion to external factors are only pertinent when irrationality and deviations must be explained. This point of view is also characteristic in Larry Laudan, in this work *El progreso y sus problemas*, published in 1986.

[3] Ethnomethodology, for example, focuses on the behavior of the scientists, individual and in group, and then environment such as laboratories and scientific societies are chosen for its study. But ethnomethodology also focuses on the incidence of science in other cultural forms. See: Galison, Peter (1987) *How Experiments End.* Chicago. University of Chicago Press; Latour, Bruno and Woolgar, Steve (1979) *La vida en el laboratorio. La construcción de los hechos científicos.* Madrid. Alianza. 1986; or Pickering, Andrew (1984) *Constructing Quarks: a Sociological History of Particle Physics.* Edinburg. Edinburgh University Press.

[4] In other words, while philosophy of science, with an inherited conception, focused on the syntactic aspects of the scientific theories, and the Semantic Conception in the semantic ones, social studies of sciences pointed out the pragmatics aspects.

[5] Alfredo Marcos (2000) *Hacia una filosofía de la ciencia amplia*. Madrid, Técnos

distinguish in the whole social, which allows us to understand it as a philosophy of science that studies the traditional aspects of scientific, epistemic, and methodological knowledge, but also its political (political philosophy of science), ethical, rhetoric and technological aspects. We may encode this transformation in the next points:

a) A change in the concepts of scientific theory and scientific knowledge has been produced. In the idea that sciences are systems of theories, this is, each science is articulated in a web of theories (and then they are the fundamental units of scientific knowledge for epistemological analysis) some aspects, very different from those that are purely theoretical, are pointed out: science is not only knowledge but also a set of activities (or interventions in the world)[6].
b) Thus, the philosophy of science cannot limit the analysis and reconstruction of the scientific theories, or the empiric knowledge and their consequences, with the restriction that it implies regarding taking scientific works and texts as the main references of the analysis. On the contrary, philosophy of science must take care of the scientific practice and the rationality in choices made by scientists: the role of scientific institutions promoting new theories and discoveries; research in laboratories and the process of consensus among researchers regarding experimenting, selecting facts and the terms used to name that facts; the influence of how to experiment and the measurements in research, as well as construction of different scientific representations for concepts and scientific theories; reception regarding scientific communities related with new facts and theories; controversies and debates among scientists, and institutions, who defend alternative proposals or theories; the problem of immeasurability among opposite paradigms, analyzed by Kuhn and Feyerabend's works, with the debate that has supposed about scientific relativism; the issue about scientific progress and, in general, about scientific purposes; the interrelations between science and technologies and, in this line, scientific applications; the impact of science and technology in the society and in the environment; and the incidence of scientific policies, private and public, about scientific activity.
c) The conceptual schedules, values, and practices in science are all relevant aspects for philosophical analysis in science development. Therefore, the philosophy of science transforms from something that is only a philosophy of scientific knowledge to a philosophy of scientific activity. However, science must be studied in its context, which is always a social context. Current science is a form of culture that has an unavoidable presence in society, because society is deeply influenced by it, and then,

[6] In the context of the conception of the theories it has also produce a change from the declarative conception of the theories, to others which point out their configuration as groups of models that apply into the reality in an approximate way, and which insist in their semantic and pragmatic aspects.

in the philosophy of science, metatheoretical and theoretical aspects in science are not unique, and are not necessarily the most fundamental[7].

d) Science is not an autonomous form of knowing, but an activity related and interrelated with other social activities[8].
e) The intense and increasingly fruitful development of relations between philosophy of science and history and sociology of science, from one part, and cognitive science on the other hand[9], as well as the appearance of the studies of science, technology, and society, and the history and philosophy of technology[10].
f) The importance of the process for the *elaboration* of the theories would include the construction of representations, and even scientific facts, the rhetorical aspects in the representation of the theories, the diffusion of them, and their technological implementation.

In this specific context, regarding the political philosophy of science, is where the current work is framed.

0.2. Science and politics

Relations between science and politics have been a constant debate throughout history. In the XX century, countries such as France, Germany, the United Kingdom and the United States promoted scientific research and the creation of scientific institutions, as well as universities,

[7] In this sense it is also claimed that although the analysis and reconstruction of scientific theories have meant to try to reduce them into formal and axiomatic systems, in traditional philosophy of science and in the labor of axiomatizing empirical theories carried out by the School of Standford and the structural program, axionatizing of theories is not effective when the actions of scientists and their aims are evaluated, because both have other components that encompass from the sociological structure and relations of power in the scientific community to the economical, technological an social impact of the theories.

[8] Echeverría claims that, according to his proposal of four contexts, in addition to the social interactions and social activities analyzed by social studies, it is also necessary to contemplate some other that would cover from the teaching of theories and techniques for researching to the construction of diverse and interconnected scientific representations and the evaluation of every phase of scientific activity.

[9] In this sense, it is notable the appearance of interpretations with genitive naturalist or biologist perspective about the developing of scientific knowledge. See: Ambrogi, Adelaida (ed.) (1999) *Filosofía de la ciencia: el giro naturalista*. Palma. Universitat de les Illes Balears; Callebaut, Werner (ed.) (1993) *Taking the Naturalist Turn*. Chicago. University of Chicago Press.; Nersessian, Nancy (ed.) (1987) *The Process of Science*. Dordrecht. Nijhoff; Giere, Ronald (1988*) Explaining Science. A Cognitive Approach*. Chicago, Londres. University of Chicago Press; Giere, Ronald (ed.) (1992) *Cognitive Models of Science*. Minneapolis. University of Minnesota Press; Fuller, Steve, et. al (eds.) (1989) *The Cognitive Turn. Sociological and Psychological Perspectives on Science*. Dordrecht. Kluwer; Martínez, Sergio y Olivé, Leon (comp.) (1997) *Epistemología evolucionista*. México. Paidós/UNAM; Rescher, Nicholas (ed.) (1990) *Evolution, Cognition and Realism.* Lanham. University Press of America.

[10] See: Medina, Manuel y Sanmartín, José (eds.) (1990) *Ciencia, tecnología y sociedad*. Barcelona. Anthropos; López, José Antonio (eds.) (1997) *Ciencia, tecnología y sociedad. Lecturas seleccionadas.* Barcelona. Ariel; López, José y Sánchez, José Manuel (eds.) (2001) *Ciencia, tecnología, sociedad y cultura en el cambio de siglo*. Madrid. Biblioteca Nueva.

by means of public funds. Among these countries, it is also Spain, where *Junta para la Ampliación de Estudios e Investigaciones Científicas* was created in 1907.

At the same time, this kind of relationship implied a social contract for science itself. This contract emerges as an analogy with the social contract originated in political theory, and give rise to a model applied to the study of the association between science and politics, mainly since WW2, but not exclusively. In such a model, the political community agrees to give resources to the scientific community in exchange for certain benefits. Therefore, this contract was based on mutual recognition, between the government and the scientific community, about the fundamental role of science and technology in the development and progress of the countries.

On the other hand, the social-scientific contract also supposed the convincement, in both parts, that science operated in all its dimensions according to its characteristic values, this is, objectivity, neutrality in searching for the truth, integrity, no interest, universalism, and responsibility in research. The unique thing less for science for its flourishment was, supposedly, freedom and resources.

However, deviations in the social-scientific contract appeared soon. There were two explanations for those deviations: firstly, related to the interest of politicians in intervening in science beyond the agreement; and secondly, related to problems of integrity (and sometimes productivity) provoked by scientific communities.

The first problem was caused due to the interest of the government in trying a higher political control over science. The second was generated by the scientific communities themselves in their attempt for preserving their autonomy. Governmental interest was justified because, supposedly, scientific praxis was not always guided by the standards of the contract, and even in some cases the scientists themselves "invented" the results of their research. In fact, after WW2, some important cases of fraud or bad practices in different scientific areas were published, and some of them were discovered by the scientific community itself. This led to questioning, in the State, about if the scientific community was able to control by itself the cases of fraud.

The problems of integrity have high importance because they can influence negatively the social perception of science, and this might justify, at least in part, the political attempts for establishing higher control. At the same time, this creates conflicts of interest: scientists always pretend autonomy and resources for their research, and politicians pretend the control and protection of their interests.

At the same time, scientific and technological development had important consequences in the relationship between science and politics. The conditions in which science and its relation with the State develops were increasingly complex. Moreover, in practice and in different moments, science and politics were together o separated depending on who had the responsibility, if scientists, politicians, or both.

The line that distinguishes both scopes of study might be blurred from time to time. In this aspect, sociologists of science argued that the line between science and politics was not easy to draw because science is a process socially constructed.

This contract was transforming, mainly because of the continuous political tension for having more control over science and the resources invested in it, and the change in the political perception, or even in the citizens, about science and scientists, given the dangerous consequences of some technologies, as well as bad praxis. This combination of factors made politicians consider that it was their duty to moderate science and technology, their development, and research, but also the productivity and integrity of the scientists.

This new framework is seen as the main source for solving pressing problems. Therefore, merits in scientific work are judged according to external criteria, such as the applicability to issues that affect society or the environment. In the same way, political control was also extended in research, and this scope stopped being only part of the scientific community, which claims, however, that the political class lacks the knowledge and the capacity to comprehend scientific issues. Finally, the result was a new form of politics of science, in which autonomy sovereignty that science had itself was diminished since the end of WW2, as well as the increase of political control over science and technology, and the dissolution of the line between science and politics under the politic rule and game of interests.

What we just described regarding relations between science and politics is not the same in every country. In some of them, these relations maintain a social contract for science but are renewed. Some examples of this are Spain, Germany, the United Kingdom and Japan.

In such countries, it develops a scientific political state, unified and well-defined, organized by few national agencies, and with national purposes and interests. Nevertheless, in this model, the scientific community still has an important grade of autonomy for research and leadership in science. Moreover, the relationship between science and the State follows trust guidelines.

In the new contract, resources are invested in basic research, such as applied investigation. Firstly, governments prioritize certain scopes of research, which has consequences in its funding. On the other hand, scientists choose freely their scope and research lines but, as far as the access to resources is affected by prioritized lines, national interests influence which direction the scientific research must take. Finally, the scientist must report on the developed research, results, and the use of the funds. Thus, in this new contract, it exists higher control by the part of the political sphere.

The new contract is organized by state institutions, like the ministries, or other organisms, and some of them are linked to each other. Scientists and technical ministerial organize this new contract for science and its development and assure the use of good practices. They are organisms that act as firewalls between the State, the scientific profession, and their demands. This permits a trust relation.

This kind of collaboration between science and politics in the framework of border entities points out an important difference regarding the classic social-scientific contract because in the latter this kind of collaboration could not fit because of its automatism. The new model recognizes the importance of organizations and institutions in its development, whether they are border or not, and they are focused on research or in the organization of science.

All in all, with the disappearance of the classic social-scientific contract, relations between science and politics have been characterized by the political predominance and game of interests, which supposes less autonomy for the scientists. Science and politics are not the same, but different spheres of action. However, they can influence and reconfigure each other, because they co-imply and co-act in the developing of the social contract of science.

0.3. The case of eugenics

Eugenics, and the eugenic project, is framed in this context because it combines theories from different scopes of studios concentrated in a reductionist and biological program, as well as in a program of political action with the purpose of improving the human species. The case of eugenics shows how different political interests that filter in the scope of scientific research, linked also with false premises and cultural prejudices, might originate catastrophic results. Moreover, each approach to medical, biological, or social disciplines from XIX or early XX century is related to eugenic perspectives diffused in Europe and North America.

The set of factors that gave rise to eugenic thought is diverse. Eugenics and hygiene thought originated during the second part of the XIX century, and they were characterized by an extremist faith in science (they thought that it could lead humanity to a superior state and eradicate social ills. Hygiene thought defended that illness was a social phenomenon. However, although the huge scientific advances at that moment, social ills were still there, especially in low classes. Then it should be asked why scientific progress does not end with that issues. Not a few people claimed that there must be a degenerative tendency that is imminent in the members of such classes.

At the same time, in social disciplines, two parallel phenomena occurred: firstly, the practice of methods related to statistic studies and, second, the almost immediate transmission of Darwinist Evolutionism from biology to social scope (Social Darwinism). Both phenomena concluded in the work of Francis Galton, father of eugenics, and the first one in giving statistical baggage to the idea that mechanisms of natural selection would also intervene on the evolution of social systems. Galton's proposal has its bases in the attempt to corroborate inductively and statistically the idea that ills that affected low classes had a relation with their heritage of physical and intellectual capacities. He tried to prove that poverty, alcoholism, etc. were a product of psychological characteristics that could be identified and were transmissible by genetic heritage.

Galton's studies gave rise to what we know as positive and negative eugenics. Proposals in positive eugenics promoted social measurements for sexual, marriage, civic education, etc., as well as for reproduction of the considered "fit" individuals because of their good physical and psychological characteristics. On the other hand, in negative eugenics, forced sterilization was promoted, as well as a direct intervention in the birth of that sector in the population with undesired features: "the unfit". For example, in the United States, there was forced sterilization of sexual delinquents.

Usually, eugenic ideas were promoted under the ideal of regeneration/hygiene of race. After WW1, the decrease in population, and the low natality, among the postwar ills gave rice to nationalist movements guided by the idea of recovering the racial greatness that war had declined. For that reason, eugenics was applied in several countries aiming to impede the reproduction of certain individuals or promote the individuals with the desired characteristics for the government.

In the case of Nazi Germany, eugenics was developed and focused on racist aspects, influenced by Nazi ideology and the belief that the Aryan race was the superior race. This played an important role in racial hygiene and extermination. In national socialist eugenics, radical and racist measurements gave rise to forced euthanasia of persons with physical or psychological disabilities, because they were seen as "not worth living". There were also measurements against determined racial communities, such as Jewish, Gipsy, etc., and were an object of extermination.

Other fascist regimes, such as Mussolini's Italy or Franco's Spain, never reaches the level of brutality of Nazi Germany because negative eugenics promoted values opposed to Catholicism. In the Spanish case, the most important works were carried out by Antonio Vallejo-Nágera with war prisoners, aiming to establish the biological fundament of the Marxist ideology. Finally, after Holocaust, the notion of eugenics was full of negative connotations, and even it is currently associated with fascist and racist ideologies.

0.4. The arrival of the new eugenics

As we pointed out earlier, scientific knowledge and activity possess the characteristic of plurality: there are epistemic, methodologic, and theoretical values, but also beliefs, suppositions, and values that are supposedly external. In the context of the multiplicity of perspectives and focuses that composes the political philosophy of science, at the end of the XX Century, it emerges liberal eugenics, which is the main topic of this thesis, created by the Australian philosopher Nicholas Agar.

This new eugenics can be defined as a form of eugenics in which future parents, with some limits, are permitted to modify their future offspring by means of selecting or modifying the desired features for it. Liberal eugenics differs from authoritarian eugenics mainly because

in the former the State maintains a neutral role when parents are making decisions about modifying the offspring.

This philosophy has its roots in the American thinker Joseph Fletcher, who wrote *The Ethics of Genetic Control: Ending Reproductive Roulette* in 1974. This work, as well as in other publications written by thinkers such as Buchanan, Dov Fox, or Norman Daniels, it is attempted to demonstrate that the issue of eugenics was not its purpose of improving the human species, but its discriminatory and brutal methods, and hence, eugenics does not have to be bad itself.

However, this new philosophy, linked with the enhancement technologies, is not free from criticism and controversy. In this thesis, with the purpose of shed light on this project, we will proceed for studying from a philosophical, political, social, and historical point of view. For this purpose, we have organized this thesis in the next chapters:

In the first chapter, aiming to understand the roots of liberal eugenics, we will analyze the origin and development of the notion of eugenics at the end of the XIX Century and early XX Century. The history and work of the British anthropologist, Francis Galton, creator of eugenics, will be studied with this purpose. Also, the diffuse and institutionalization of eugenics in institutions like *Eugenics Record Office* or *Eugenics Education Society*, and the differences between positive and negative eugenics, will be analyzed. Finally, we will focus on how Galton's concept and project was implanted in Nazi Germany, Franco's Spain, as well as in the United States in the early XX Century, and how the decline of eugenics was produced.

In the second chapter, the origin and development of liberal eugenics and its differences from authoritarian eugenics will be studied. For this purpose, we will study the origin of this concept, created in 1998 by the Australian philosopher, Nicholas Agar, its definition, and its purposes. The ideas of the American thinker, Joseph Fletcher, his idea to put an end to what he calls "the reproductive roulette", and his conception of "genetic engineering", will be examined. In relation to the latter, several distinctions that appear in genetic interventions will be studied, such as the difference between therapy and enhancement, or the distinction between *Nature* and *Nurture*. Finally, we will conclude with three main differences between authoritarian and liberal eugenics, focused on the role of the State, the importance of the environment and the genetics of the new individuals, and pluralism against monism regarding human eminence.

In the third chapter, we will focus on the tools that might useful for liberal eugenic purposes, this is, the enhancement technologies. Four of them will be analyzed: cloning, PGD, CRISPR, and Artificial wombs (AW). In cloning, we will study the difference between reproductive and therapeutic cloning, as well as the process of cloning known as *Somatic Cell Nuclear Transfer,* and expose the story of Dolly, the first mammal clone. Lately, we will focus on genomics and the technique known as *Preimplantation Genetic Diagnosis* (PGD),

and the experiment carried out with Doggy mice at the end of the 90s. Next, we will study the functioning of *Clustered Regularly Interspaced Short Palindromic Repeats,* better known as CRISPR, their functions, and experiments carried out with them during the pandemic of COVID-19. Finally, we will analyze the technology of Aws, and distinguish between partial and complete ectogenesis, and the experiment of the *Biobag* in 2017, created by researchers in Philadelphia. In the end, diverse critiques against enhancement technologies, focused on the consequences of their use, will be examined.

The fourth chapter will be focused on the social and political perspective of liberal eugenics and the enhancement technologies. Proposals of thinkers such as John Rawls, Allen Buchanan, and Norman Daniels, among others, will be analyzed. We will study the idea of equality of opportunities and distribution of goods in a supposed State in which enhancement technologies are allowed, as well as *Level Playing Field Conception.* Also, we will distinguish two possible political models regarding genetic interventions: Public health model and Personal Service Model. In this context, the roles of bioengineers and future parents in genetic modifications, reproductive freedoms of the latter, and possible risks to avoid (like the creation of a communitarian eugenics) will be examined. Finally, we will repass what could be affordable in a State in which parents enjoy those rights, quoting the notion of "capable" and what this represents, the moral limits of the political models mentioned earlier, genetic internationalism, and the limits that we should impose to reproductive freedoms.

The fifth chapter will be oriented to the diverse critiques against liberal eugenics, argued by several philosophers and thinkers. We will quote Jürgen Habermas regarding autonomy and individuality of the new beings; the arguments of the American-Japanese political scientist Francis Fukuyama in relation to human essence and the utilitarian view that, from his point of view, liberal eugenics possesses; the American philosopher Michael Sander and his idea that liberal eugenics might break children-parents bonds; and, finally, the Costa Rican lawyer, Catalina Devandas, and the American-Japanese philosopher, Donovan Miyasaki.

The sixth and last chapter, dedicated to the conclusions, includes my own position regarding the critiques of the five authors quoted in the fifth chapter. I repass the irreversibility of parents-children relations in Habermas, analyze the utilitarian reduction in Fukuyama, as well as his thoughts about the loss of human essence due to the enhancement technologies; I try to answer the triple problem claimed by Sandel regarding paternal humility, paternal responsibility, and the solidarity in relation to insurance companies; examine Devanda's arguments against this new eugenics and in favor of disables people; and analyze the supposed bad intentions in liberal eugenic philosopher from Miyasaki point of view. I will finish the thesis with some final remarks.

1. OLD EUGENICS, BIRTH, SPLENDOUR, AND DECLINE

In order to introduce the context of liberal eugenics, this chapter will focus on its origins, the beginning of eugenics, its history, development, and downfall after World War II. Likewise, it will also visualize various authors who were prominent throughout the history of this project. To this end, what has been presented in two previously presented works will be exposed. Firstly, *La Eugenesia, el caso español entre Gregorio Marañón y Antonio Vallejo-Nágera,* from 2015, and secondly, *El Origen de la Eugenesia y de la Biometría Contemporáneas*, from 2016.

1.1. Francis Galton and the origin and development of eugenics

Although the idea of eugenics can be traced back to pre-Plato times, it was not transcendental in the contemporary era until Francis Galton created the term and developed it in several of his works.

1.1.1. Who was Francis Galton?

Francis Galton, the cousin of the well-known naturalist Charles Darwin and grandson of the physician and philosopher Erasmus Darwin, was a British anthropologist, psychologist, meteorologist, inventor, geographer, statistician, polymath, and explorer born in Birmingham on 16 February 1822. Born into a Quaker family[11], Galton showed unusual skills for study from an early age. By the age of five, he had a developed dominion of English and Latin. In 1840, he began his studies in mathematics at Trinity College, whose environment impacted him forever. This would inspire him years later to study heredity in humans[12]. However, Galton was overcome by the difficulty of such studies and, as an alternative route, in 1844 he obtained a *Bachelor of Arts degree*. After graduating he devoted himself to exploration, taking cartographic data and expeditions in Africa and Asia, traveling to places such as South Africa, Namibia, and the Middle East. Later, in 1853, he published *Recent Expedition into the interior of South-Western Africa*, in which he recounts his journey to Africa between 1850 and 1852. It was with the publication of this book that Galton began to gain international fame and recognition, winning a gold medal at the *Royal Geographical Society* in 1853.

Sometime later, he suffered a nervous breakdown, from which he recovered while reading *Origin of Species,* published in 1859 by his cousin, Darwin. In this book, Darwin expounded his theory of evolution, according to which species evolved by experimenting continuous changes over time. This work by Darwin was key for Galton, as it was from it that he began

[11] The Quakers, or Religious Society of Friends, is a religious community founded in England in the 17th century by a dissident named George Fox, characterised by a pacifist and Protestant stance towards the Anglican church. https://www.bbc.com/mundo/noticias/2015/05/150427_quakers_cuaqueros_fe_chocolate_finde_dv

[12] Álvarez, Raquel (1985) *Sir Francis Galton, padre de la eugenesia*. Spain, Consejo Superior de Investigaciones Científicas, Centro de estudios históricos. pp: 29-30.

to develop the concept of eugenics, which studies the mechanisms to favor the improvement of the human race through genetic inheritance.

This concept began to develop between 1863 and 1864, when Galton wrote "Hederitary Talent and Character", published in two parts in the monthly *Macmillan Magazine.* In these publications, in which the ideas that would later give rise to eugenics were first seen, a technique used by Galton in order to examine the inheritance of talent and character is also shown: the analysis of pedigrees[13]. Today, this form of genetic analysis is used to analyze the genes that cause various genetic diseases.

In 1869, Galton wrote one of his most important works, *Hederitary Genius,* in which he develops and explains, in a more extensive way than in "Hederitary Talent and Character", the statistical study of kinship, in which he adds the study of the so-called normal distribution or Gaussian curve[14], which consists of a curve represented by two extremes and a bell curve: the first end represents people with a characteristic below the general average, the second end represents people who excel the general average in that characteristic, and in the middle, shown as a bell curve, is the general average[15]. In *Hederitary Genius* Galton used this method focusing on traits such as intelligence[16]. In this way, he found that traits such as eminence were genetically heritable. In other words, people who had eminent ancestors, this is, who excelled in their profession, were more likely to be eminent as well. In this way, Galton converts qualitative information into numerical data, following the assumption that a given person was eminent or not[17].

Years later, concerned about the situation of the English population after the Crimean War, which took place between 1853 and 1856, he published in 1873 the article "Hederitary Improvement" in *Fraser's Magazine,* in which he pointed out the problem of the improvement of the English population[18]. Later, in order to obtain information about eminent

[13] This is a genetic analysis in which the geneticist makes a diagram in which an individual with a marked trait to be studied is analysed, together with his or her known relatives, in order to see which relatives have the same trait as the individual studied and how this is transmitted.
[14] Karl Friedrich Gauss (1777-1855) was a German mathematician, physicist and astronomer, considered, along with Archimedes and Newton, one of the most influential mathematicians in history. He contributed to mathematical analysis, number theory, differential geometry, magnetism, among other fields.
[15] This curve was an arithmetic measure, and was divided into two halves. The ends of the curve represent the deviation from the mean. Thus, the curve represented the fact that the further away from the mean, the lower the frequency of the data.
[16] In addition, Galton also used the Gaussian curve to study the distribution of other population traits such as weight or height, and to analyse their variations. In conclusion, he proposed that the laws of heredity could be treated mathematically and statistically. Therefore, in 1884, he promoted the creation of an anthropometric laboratory attached to the South Kensington Science Museum in London, with the main objective of obtaining and analysing anatomical and functional data on individuals from different social groups.
[17] Let us bear in mind that, in that time, the term "statistics" referred to "state numbers", this is, population and manufacturing indices. However, Galton turned statistics on its head and used it for theoretical and mathematical analysis by employing Friedrich Gauss's method, derived from the analysis of the errors given in measurements of certain physical quantities. The graphical representation of these measurements provided a bell-shaped distribution of these errors, as noted above.
[18] The statistician Karl Pearson, who for many years worked with Francis Galton, considers this article to contain the most essential basis of eugenics.

British people, he elaborated psychological questionnaires, whose results were published in *English men of Science: Their Nature and Nurture* in 1874.

Finally, in 1883, Francis Galton published the work that gave birth to the term eugenics: *Inquiries into Human Faculty and its Development,* in which the word "eugenics" was defined as the practices and knowledge aimed to improve heredity in the population by means of marriage and mating[19]. In this way, eugenics would be the science of improving human nature, focusing on the most gifted individuals to favor their reproduction, and reducing it in the less gifted ones.

Also during this period, between 1877 and 1885, Galton studied the inheritance of psychological factors, believing that the mental characteristics of individuals, such as alcohol and drug addiction, criminality, stupidity, among others, could be reflected in their physical appearance[20]. He thought that the common characteristics of individuals could be visualized by superimposing photographs of the face. He, therefore, carried out an analysis of photographs belonging to the faces of thieves, rapists, and murderers in order to typify them. To carry out this study, he collected several photographs of various criminals and delinquents, all of which were taken from the front. He then made them all the same size, and superimposed them on top of each other, like a book, so that the eyes, mouths, and noses would fit together. The next step was to fix the book of photographs on a wall so that he could pass the photographs in a row. Then he put a camera on the photo book fixed to the wall, putting a photographic plate inside. Finally, he photographed page after page in succession[21].

Although this work did not lead Francis Galton to identify key characteristics that could identify criminals, by studying the identification of other personal traits, such as human fingerprints, he was able to reach a conclusion. Using the anthropometric laboratory in London, he was able to access and classify various fingerprints. After his research, he concluded that people's fingerprints remain unchangeable over time, and that each individual has unique fingerprints, even if they are identical twins. This was therefore a feasible method of identifying individuals, and a valuable contribution to anthropological studies. Galton's studies on fingerprints were published in his books *Finger Prints*, in 1892; *Decipherment of Blurred Firger Prints,* in 1893; and *Finger Prints Directories,* in 1895. These studies were and are of great relevance in research fields such as anthropology.

[19] Galton, F: *Inquiries into Human Faculty and its Development*, United States, Macmillan and Company. pp: 24-25.
[20] One of the main characteristics of the thinking of Galton and his followers, as we shall see below, was genetic determinism, that is, the defence that we are what our genetics says. Thus, psychological traits such as alcohol and drug addiction were considered to be genetically inherited characteristics, passed on from parents to offspring. This ended up being one of the main errors of eugenic thinking, and one of the reasons for its failure in the 20th century, as it was forgotten that factors such as the environment, education, and the social and emotional relationships of individuals can also influence their psychological characteristics and thus give rise to various diseases and/or addictions.
[21] For further information see "Francis Galton and Composite portraiture" https://galton.org/composite.htm [Accessed 14 October 2021].

During these years, at the end of the 19th century, one of the main sources of concern for him was the fertility of the British population. He argued that it was lower in the more endowed classes and races, which, in his view, led to a decline in the country. He also blamed the Crimean War as part of the problem[22]. He claimed these concerns in 1891, in his presidential discourse to the Demographic Congress in London. It was at this point in his life that he met Walter Frank Raphael Weldon (London, 1860 - Oxford, 1906), an evolutionary zoologist working at Cambridge. Weldon focused his studies on the morphology of living organisms.

It was also at this time that Galton met one of his main collaborators for the next few years: Karl Pearson (London 1857-1936), a British mathematician, historian, German philologist and thinker. Throughout his career, Pearson developed extensive research about statistical methodology in human population studies and genetic inheritance. He was also one of the pioneers of the so-called biometry, which was the product of the study of the genetic inheritance of human beings by adding statistical methods. In other words, biometry is the quantitative study of characteristics in populations, and it can determine the percentage of characteristics, both physical and mental, of different human populations.

At the beginning of the 20th century, Galton, already at the end of his life, concentrated his efforts on the dissemination and institutionalization of eugenics. This period of his life will be analyzed after. Also, during his last years, he tried to have the eugenic positions, to which he had given rise, reflected in the laws of the United Kingdom. With the help of Charles Darwin's son, the politician and economist Leonard Darwin, he tried to lobby the UK to do so. However, it was unsuccessful. Finally, in 1911, he died of tuberculosis in Haslemere (Surrey, UK). After his death, the concept of eugenics gradually spread both in the UK and abroad.

1.1.2. The concept of eugenics

The concept of eugenics comes from the Greek term *eugoniké* (written in Greek ευγονική), meaning "good origin". This concept refers to the improvement of human beings, by means of genetic inheritance, through different methods of manipulated intervention and selective methods such as the union in marriage of persons considered fit or the sterilization (or even elimination) of beings considered unfit.

As it was mentioned in the previous section, it was Galton's *Inquiries into Human Faculty and its Development and its Development*, originally published in 1883, that was the first book in which the term "eugenics" appeared. However, even earlier, in 1869, Francis Galton had published *Hederitary Genius.* It was in this work that he founded the scientific, political, and social discipline that gave rise to the idea of eugenics.

The origins of this idea go back to Francis Galton's approach to the work of his cousin, *Origin of Species*. In this work Darwin, as it was mentioned above, explains his theory of evolution, in which the different species, over time, evolved, underwent changes and modifications, adapting in this way to the environment in which they found themselves. It is important to

[22] Álvarez, Raquel (1985) *Sir Francis Galton, padre de la eugenesia*. pp: 141-142.

note that, at that time, this work was very discussed and gave rise to an intense debate between Darwinists and the Church about the origin of the human being.

However, from a practical point of view, Galton got elements to develop his concept of eugenics from Darwin's *The Variation of Animal and plants under Domestication*, published only a year before *Hederitary Genius,* in 1868. In this book, Darwin explains, in a more detailed way, the genetic inheritance in domesticated animals and cultivated plants. Also in the same book, a theory regarding the mechanisms of transmission of characters is set out. This theory was called "pangenesis", and it argued that all parts of an organism are capable of producing gemmules, which are elements capable of producing in the new individual the traits from which it originates, this is, its ancestors, starting with its progenitors. According to Darwin, gemmules were capable of circulating in the blood[23].

Galton wanted to test whether Darwin's assertion was true. To do so, the two men performed experiments on rabbits of different colors, black and white, and tried to do transfusions of blood between them. Darwin and Galton expected that these transfusions would change the color of the rabbits' offspring. However, this did not prove to be the case, and it was shown that, because it was not the blood that transmitted the elements capable of reproducing in the new individual, their site of origin, the gemmules, did not circulate in the blood. After this experiment, Galton exposed his own theory of heredity, which had certain similarities to Darwin's fundamentals, but also certain notable differences.

1. Each of the many independent units that make up the body has a separate origin and germ.
2. The lineage has a multitude of germ units, which were much more varied and numerous than the organic units of the body from which they came, so many of them failed to develop, and the number of germs that did develop was relatively small.
3. Germs that do not develop retain their vitality and propagate by remaining dormant, and they contributed to forming the lineage of descendants.
4. The organization of the units that make up the body depends entirely on the similarities and discrepancies that exist between the separate germs, both in the state of lineage and in all periods of their development[24].

The experiments between Galton and Darwin continued until 1875, the same year in which Galton published *A Theory of Heredity*, concluding his experiments on the mechanisms of heredity. Lately, he continued to carry out his experimental work inspired by Darwin's proposals. Thanks to these experiments, and his inspiration from statisticians such as the Belgian Adolphe Quetelet and the already mentioned Carl Friedrich Gauss, he discovered the phenomenon of "reversion", which would later be called "regression"[25]. This statistical phenomenon consisted that if a variable differs greatly from its first measurement, then it will be closer to the mean of its second measurement and, at the same time, if a variable differs greatly from its second measurement, then it will be closer to the mean of its first measurement, so that the values tend to return to the original mean.

[23] Darwin, Charles (1868) *La variación de los animales y las plantas bajo domesticación*. García Gonzáles, Armando (translator) México, Biblioteca Darwiniana. p. 810
[24] Álvarez, Raquel (1985) *Francis Galton. Herencia y eugenesia.* Madrid, Alianza Universidad. p. 34
[25] Álvarez, Raquel (1985) *Sir Francis Galton, padre de la eugenesia*. pp: 65-66

Because of his discovery, he continued to work on the problems of the British population for the next few years. According to him, these problems had increased at the end of the 19th century because of an agricultural crisis and the great British social differences. He, therefore, advanced his studies on the phenomenon of regression, and in 1888 he introduced the concept of "the correlation", to define the ratio index of regression.

Some years after his experiments with Darwin, eugenics, already formulated, sought, according to Galton, the action of evolution. Galton aimed for eugenics to become a new modern scientific religion because religion was a set of moral and ethical rules of conduct for organizing society[26]. Eugenics aimed to identify the most physically and psychologically prominent individuals within a society and to promote their marriages. For this reason, individuals who could deteriorate the race (physically or psychologically handicapped, sick, criminals, alcoholics) had to be identified in order to prevent their marriage and subsequent reproduction. This was one of Galton's main concerns: to identify individuals and, with the aim of improving the race, to control their reproduction.

Decades later, in 1904, during a session chaired by Karl Pearson at the congress of the *Sociologial Society*, Galton would finally develop his eugenic ideas in a lecture entitled "Eugenics: its Definition, Scope and Aims". In this lecture, Galton defined eugenics as the science which dealt with all influences which improved the innate qualities of a race and those which might develop it to its highest superiority[27] . He also argued that eugenics aimed to ensure that those classes that were useful to society would contribute to forming generations that were getting better. To achieve this goal, Galton believed that knowledge of the laws of heredity should be disseminated and its study promoted. Similarly, historical research about the contribution of different social classes to the formation of the population in past ages should be carried out, and a statistical collection of facts should be made to demonstrate the conditions under which the best families originated. It was also necessary to study the influences directly affecting marriage[28], and to persist in spreading the national importance of eugenics. It was on this last point that it was necessary to pass through three stages: (1) Eugenics should be made familiar as an academic question. (2) It should be recognized as a subject whose practical development deserved serious consideration. (3) It should be introduced into the national consciousness as a new religion.

1.1.3. Karl Pearson, Francis Galton's right-hand man

It is not possible to continue with the history of eugenics and Francis Galton without first highlighting one of his most important collaborators: Karl Pearson.

Born in London on 27 March 1857, Pearson, as it was mentioned above, was a British mathematician, historian, Germanic philologist, and thinker, who carried out a deep study of statistical methodology in the study of human population and genetic inheritance, being one of the pioneers of so-called biometry. When he was only 22 years old, he adopted freethought

[26] Álvarez, Raquel (1985) *Francis Galton. Herencia y eugenesia.* p. 15
[27] Galton, Francis (1904) "Eugenics; its definition, scope and aims" *Nature*, vol. 70. p: 82
[28] Galton argued that the influences affecting marriage were social and therefore transformable.

as a religious faith founded on science and completed his studies in mathematics at Cambridge University. Shortly afterward, between 1879 and 1880, he studied medieval literature at the universities of Berlin and Heidelberg, which had a great influence on him. This inspired him to write autobiographical novels, in which he reflected himself as an unfulfilled man with great ambitions.

Pearson, in his novels, spoke of his career and marriage as if they were great failures. He also portrayed himself in those stories as cold, rational, and unemotional. In 1880, under the pseudonym Loki, he published his novel *The New Werther*, a title reflecting his taste for the works of the romantic German W. A. Goethe. On his return to London, he studied law at the *I. Temple*, but never worked as a lawyer[29]. Pearson sought other ways to exploit his intellectual powers, such as mathematics. He tried to pursue this path, and eventually, in 1884, he was appointed professor of applied mathematics at University College London. During these years, he also became interested in the social question of women. For this reason, in 1885, he founded the *Men and Women's Club* in England, where the relations between men and women were discussed[30]. The club had about fifteen members, and its main topics of discussion were prostitution, marriage, women's economic capacity, and sexuality, as well as contraception and venereal diseases[31]. Inspired by women's issues, Pearson published *The Ethic of Freethough* in 1888. However, the club would eventually disband in 1889.

Karl Pearson's life would take a turn in 1891, when he was appointed professor of Geometry at *Gresham College* in London, since at this point in his life he met the zoologist and biologist Walter Frank Raphael Weldon, who, in turn, would eventually introduce him to Francis Galton. The three became close collaborators and worked together on eugenics. The following year, in 1892, Pearson became involved in statistics, in collaboration with Weldon, and largely in response to his requests in connection with Weldon's zoological research. Pearson provided adequate tools for the statistical study of scientific and social problems and founded statistics as we know it today, along with many of its variables, concepts, and functions. He aimed to provide a tool that would give certainty where previously there was only enigma and hypothesis. Also, during the same year, he published *The Grammar of Science,* where he dealt with subjects such as geometry and physics, the concept of scientific law, cause, effect, and probability, defending in this work that the aim of science was not to explain, but to describe and discover a descriptive formula for nature and to predict its future.

The mathematical support that Pearson received from Weldon, together with his work in statistics, was fundamental to eugenics and the development of statistics. In this way, the study of heredity, using statistical methods, gave rise to biometry, which was the quantitative statistical study of biological characteristics in populations[32]. The origins of statistics are therefore inseparable from the origins of biometry. With Pearson's statistical developments,

[29] Karl Pearson probably came to study law because his father put a lot of pressure on him to study criminal law. Because of this, Pearson wanted to escape from this path.
[30] One of the members of this club was Maria Sharpe, who was to become Pearson's first wife.
[31] Kelves, Daniel (1985) *In the Name of Eugenics.* United States, University of California Press. pp: 24-25.
[32] Porter, Theodore (2004) *Karl Pearson. The scientific life in a statistical age*. United States, Princeton University Press. p: 270

biometrics determined the percentage of characteristics, both physical and mental, of different human populations.

Thus Pearson, by calculating correlations between relatives and generations, used the development of his statistical calculations to determine how likely an individual was to inherit certain diseases, disorders, and traits. Biometry made it possible to establish statistical relationships between physical traits and intelligence, the resemblance between first cousins, the effect of parents' occupation on the well-being of their offspring, and the role of inheritance of ailments such as alcoholism, tuberculosis, or visual impairment. Pearson's statistical studies were set out in his books published at the end of the 19th century: *Skew variation in homogeneous material* (1895), *Regression, heredity and panmixia* (1896), and *The Chances of Death and Other Studies in Evolution* (1897).

At the beginning of the 20th century, Karl Pearson, together with Francis Galton, Charles B. Davenport[33], and Raphael Weldon, laid the basis of biometry, born from the inspiration of Galton's work published in the book *Natural Inheritance*. Furthermore, in 1901, Francis Galton, Raphael Weldon, and Karl Pearson founded the journal *Biometrika, A Journal for the Statistical Study of Biological Problems*. In this journal, studies on anthropometric data (about human proportions and measurements) were published systematically. These studies had a statistical basis and a mathematical treatment: the differences between individuals were used from a statistical point of view, from the perspective reflected in the principles of Charles Darwin's theory of evolution. In other words, differences between individuals were treated on the basis of individual differences between individuals of the same race, population, or species. Those studies that were included in the journal were research directed or conducted by Karl Pearson himself.

It was at this point in history, around 1900, when Mendel's ideas[34] became widespread in England, following the rediscovery of his work originally published in 1865 and translated into English by the Cambridge biologist William Bateson[35]. This rediscovery, at that time, created a great debate between bioethicists, such as Pearson and Weldon, and the supporters of Mendelism. The bio-metricians, followers of Galton, argued that variation in populations followed certain statistical laws, and they supported the continuous evolution of Charles Darwin, who argued that continuous variation was what was inherited in the population by selection, allowing individuals to survive in the face of adversity. In other words, individuals, according to Darwin, lived in continuous change to adapt to the changing world around them.

[33] Charles Benedict Davenport (1866-1944) was a prominent American biologist and eugenicist, the driving force behind eugenics in the United States. He established and directed the *Eugenic Record Office* in Cold Spring Harbor, New York.

[34] Gregor Mendel (1822-1884) was an Austrian monk and botanist who, through his experiments on the phenomena of inheritance in peas, formulated the laws known as *Mendel's Laws*. His observations led him to coin two terms that are used in genetics today: dominant and recessive.

[35] William Bateson (1861-1926) was an English biologist and geneticist, and one of the rediscoverers and advocates of Gregor Mendel's work. His most prominent works on Mendelism were *Hybridisation and Cross-Breeding as a Method of Scientific Investigation*, presented at the First International Conference on Hybridisation in London in 1899; and *The Mendelian Principles of Inheritance: A Defence with Translation of Mendel's Original Works on Hybridisation*, published in 1902.

On the other hand, the proponents of Mendelism, of which Bateson himself was one of the most prominent leaders, rejected Darwin's continuous evolution and defended discontinuous evolution. This is, according to Bateson, discontinuous variations in the population allowed for evolutionary success in individuals. In other words, the advocates of Mendel's laws believed that evolution consisted of a process of discontinuous leaps[36].

As far as Galton was concerned in this discussion, he presented a middle position. On the one hand, he agreed with the biometricians that variation in populations followed statistical laws, but, on the other hand, he differed on Darwinism. Like Mendel's supporters, Galton believed in discontinuous evolution, which separated him from the bio-metricians.

The controversy between the biometricians and the defenders of Mendel was not simply a discussion about theories of evolution. Both claimed to dominate the field of genetics[37] - a term coined by Bateson himself - using different theories and methods.

Later, when Francis Galton died on 16 January 1911, he left part of his estate to a research post in eugenics at the University of London. This post was filled by Pearson. To this was added the biometry laboratory, a subject that will be discussed later. The resulting union created the Department of Applied Statistics at University College London. It is worth noting that this was the first statistics department in the world[38].

Years later, Karl Pearson wrote a three-volume biography of Francis Galton entitled *The life, letters and labours of Francis Galton*, which became a major source for Galton and eugenics studies. The first volume was published in 1914, the second in 1924, and the third in 1930.

During the First World War (1914-1918) Pearson's work and studies in eugenics, statistics, and biometry were interrupted. During the war, he met Ronald Fisher[39], a young mathematician who had impressed him with his talent in the field of statistics, so he decided in 1919 to offer him a position in his laboratory. However, Fisher turned down the offer and began working at the *Rothamsted Agricultural Experiment Station* in Harpenden, England. Fisher would eventually become Pearson's greatest critic in the field of statistics, accusing him of being unoriginal and incompetent, because, for Fisher, modern statistics consisted of significance tests[40] applied to experimental reports[41].

Finally, in 1933, Pearson retired, and the university authorities decided to split the *Galton Laboratory for National Eugenics* into two departments: one for eugenics, headed by

[36] Barahona, Ana (2001) "Continuidad evolutiva y discontinuidad genética" In: Barahona, Ana; Martínez, Sergio; Suárez, Edna (2001) *Filosofía e historia de la biología*. Mexico, Facultad de ciencias, Dirección general de publicaciones y fomento editorial, Universidad Nacional autónoma de México, pp: 417-429.
[37] Ibid.
[38] Or at least that says the website of the History department of University College London. https://www.ucl.ac.uk/statistics/department/history
[39] Sir Ronald Aymer Fisher (1890-1962) was a British mathematician and biologist. He combined mathematics with Mendel's laws and natural selection in such a way that he created a new synthesis of Darwinism known as the modern evolutionary synthesis.
[40] A significance test is a test to differentiate whether, after an experiment, there has been a random change in the test subject or a change caused by the experiment itself.
[41] Porter, Theodore (2004) *Karl Pearson.* p. 278.

Rondald Fisher, and the other for applied statistics, headed by Egon Pearson, Karl Pearson's son. Three years after his retirement, on 27 April 1936, he died at the age of 79.

1.1.4. Francis Galton and the spread and institutionalization of eugenics

As it was mentioned in the previous sections, it was at the beginning of the 20th century that Galton focused on the task of disseminating and institutionalizing eugenics. The first step towards this task was taken in 1901, when he exposed the Huxley Lecture[42] at the Anthropological Institute of Great Britain, entitled *The Possible Improvement of the Human Race Under the Existing Conditions of Law and Sentiment.* In it, he explained his view of social classes. The lecture was published in *Nature* magazine and the popular *Science Monthly* in New York.

His second step was the lecture "Eugenics: its Definition, Scope and Aims" presented in 1904, mentioned above. Galton's aim here was to show that, since it is better to be a good specimen than a bad one of its kind, it is better to be healthy than to be sick, just as it is better to be strong than to be weak, and the same is true of being intelligent than not to be intelligent. The main aim of eugenics was to promote that each group of human beings should be composed of its best representatives and thus improve the human species.

During the same year, in October 1904, Galton took the third step in the institutionalization of eugenics. This step was the creation of a working committee at the University of London, which, in addition to Galton, included Karl Pearson. This working committee aimed to collect records of English families who had a high number of eminent close relatives and made use of the expression national eugenics as a reference to social control measures that could benefit or harm the racial qualities of future generations, both physically and mentally[43]. Another important event of this year was Galton's creation of the *Eugenics Record Office* at University College London, of which he was in charge for two years. At that time, he was eighty-four years old. At the same time, he created the Biometry Laboratory, which was headed by Karl Pearson, who had a working group to collect, measure and calculate statistical data from the population[44].

After Galton's two-year directorship of the *Eugenics Record Office*, in 1906 he asked Pearson to take over the office as well, as he no longer had the strength to run it, which Pearson accepted. From the union of the Biometrical Laboratory and the Eugenic Record Office came the *Galton Laboratory for National Eugenics*, a laboratory whose aim was to gather statistical data on the physical and mental conditions of human beings and how these conditions were

[42] This award was established in 1900, in memory of Thomas Henry Huxley, and it is the highest honour bestowed by the *Royal Anthropological Institute*. It is awarded annually, by vote of the committee, to a scientist, British or foreign, distinguished in any field of anthropological research. The lecture is usually given at a dedicated event in November, followed by the presentation of the award. The lecture speech is usually published by the Institute.
[43] Álvarez, Raquel (1985) *Sir Francis Galton, padre de la eugenesia*. p. 156.
[44] Porter, Theodore (2004) *Karl Pearson.* p. 262.

related to heredity and environment[45]. Following the creation of this laboratory, the *Eugenics Record Office* (E.R.O.) in Washington was established and headed by Charles Davenport.

Over the next few years, he continued to devote himself to the dissemination of eugenics, and he considered setting up a eugenics association. To this end, in the winter of 1907-1908, the *Eugenics Education Society* (E.E.S.) was created, although Galton had not been involved, at least not in any obvious way. This association, unlike Galton, advocated statistics and population studies from a health perspective. Because of the S.E.S., the eugenics that Galton advocated, that of family records and statistics, was gradually being lost and transformed into something else. However, he believed that, although S.E.S. did not entirely share his ideas, this was how eugenics would develop, and he kept abreast of its evolution and workings. He, therefore, joined as a member in 1908 and shortly afterward was made honorary president.

However, although Galton was willing to be a member of this society, his colleague Pearson had different ideas. The *Galton Laboratory for National eugenics,* with Pearson at its head, had many discussions with the E.E.S. Pearson discussed with the members of that eugenics society because they propagated different eugenics, which followed a different course and had other intentions. Moreover, most of the members of the E.E.S. were advocates of Mendelism. Galton, for his part, tried to soften the clashes between the two groups, although he always defended Pearson's work.

After Galton's death in 1911, eugenics continued to develop in Britain and in other states, such as Germany, where the *Chair of Racial Hygiene* was built in 1923. Also during this period, between 1920 and 1933, Pearson organized annual banquets at the *Galton Laboratory for National Eugenics* which served to improve the working environment for the workers and to receive distinguished visitors such as the Danish statistician Harald Westergaard or the American statistician Walter Shewhart. At these banquets, lectures were given in memory of Francis Galton, eugenics, and biometrics.

In this way, eugenics gradually developed and spread throughout the world in different ways. In the following section, I will focus on what these forms were, together with their main characteristics.

1.2. Positive eugenics and negative eugenics

The measures in which the applications of eugenics took shape were diverse and varied from country to country or even region to region, and gave rise to two distinct eugenics: positive eugenics and negative eugenics. Both eugenics share the goal of the improvement of the human species but differ in terms of the measures and techniques to be used to achieve this goal.

[45] Álvarez, Raquel (1985) *Sir Francis Galton, padre de la eugenesia*. p. 157

Firstly, positive eugenics consisted of a set of recommendations to the population regarding how to choose a partner and the characteristics that this partner should have[46]. These recommendations included health recommendations, as well as certain prohibitions such as abortion. The aim of positive eugenics was, therefore, to improve the health and function of the population by increasing the reproductive ratio among those with better traits and abilities. To this end, traditional reproductive practices were modified, though usually through voluntary measures. For example, to inspire people to choose their spouses appropriately, competitions were held at fairs between families to see which had produced the best human reproduction (the best offspring).

On the other hand, negative eugenics consisted of a set of politically imposed measures on the population, such as forced sterilization of those considered unfit or less radical measures such as making marriage difficult or forbidden. The aim of negative eugenics was to reduce dysgenic effects by eliminating diseases, disorders, etc.[47]. Thus, the main goal was to prevent the reproduction of less healthy and less able individuals, going so far as to restrict their reproductive rights. In other words, while positive eugenics focused on improving the beings considered fit, negative eugenics focused on the other half, this is, preventing unfit beings from reproducing in order to reduce or even eliminate their numbers, with measures such as the prohibition of interracial marriages or sterilization.

An example of positive eugenics was in Nazi Germany, where abortion by women considered fit was strictly forbidden[48]. In addition, Nazi officers were persuaded (and even encouraged) to marry Aryan women and have a large number of children. In such marital unions, the offspring were placed in families chosen by persons in charge of the German eugenics programs so that the offspring would have the desired growth and development to become "fit" beings[49].

The Nazi *Lebensborn* project, created in 1935 by Heinrich Himmler, served this purpose until the end of World War II. In this project, children were abducted from Nazi-occupied areas such as Norway, the Netherlands, among others. These children were the children of women who had been impregnated by members of the SS, sometimes as a result of sexual abuse. The aim was to create the most perfect infants possible, who, after being abducted, were taken to Germany to be "Germanized" in Nazi adoptive families[50] .

On the other hand, negative eugenics had its apogee in both Europe and the United States, with sterilization laws whose ultimate aim was to reduce the number of individuals with undesirable abnormalities in the population and to isolate them in centers so that they would

[46] Saleeby, Caleb (1909). *Parenthood and Race Culture*. UK, Cassel and Company, LTD. p: 172.
[47] Ibid. p: 172.
[48] Hunt, John (2001) "The Abortion and Eugenics Policies of Nazi Germany" [online] Lifeissues https://www.lifeissues.net/writers/air/air_vol16no1_2001.html [accessed 27 September 2021].
[49] Larry, Thompson (1971) "Lebensborn and the Eugenics Policy of the Reichsführer-SS", *Central European History,* vol. 4, pp: 54-77.
[50] Ibid.

not reproduce. In the US, negative eugenics was seen, in the words of judge Oliver Wendell Holmes Jr, as a "necessity" to prevent human beings from sinking into incompetence[51].

However, the difference between positive eugenics and negative eugenics does not mark a moral line in the eugenics movement. Rather, it reflects two aspects of the same goal: to improve the population. The distinction between them lies crucially in a line that separates what is considered subnormal or abnormal or defective, and what is considered normal or superior[52]. The scope of negative eugenics (this is, what counts as a defect should be eliminated) clearly depended on the conception of normal or superior genotype or phenotype that was used. If one has a very idealized view of normal or superior traits, then this could mean that a trait that we ordinarily take as normal could count as defective. The elimination of these traits became the hallmark of negative eugenics. But definitions of "inferior types" or "socially superior" were not free of racial stereotypes, so negative eugenics ran the risk of becoming racist, or even genocidal.

Many cases of abuse were committed in the name of negative rather than positive eugenics. The prevention of disease became the prevention of certain people or even their elimination, and many reproductive rights were infringed in the pursuit of eugenic ends.

1.3. Spread and development of eugenics in Europe and America

The measures in which the application of eugenics took shape were diverse, giving rise, as we pointed out in the previous section, to positive and negative eugenics.

1.3.1. Eugenics in Europe in the 20th century

Several countries on the European continent adopted eugenic measures within their policies.

In Sweden, between 1935 and 1976, 62,000 people were forcibly sterilized, especially people suffering from some form of mental illness. Also in Sweden, as in many other countries, sterilization was practiced on ethnic and racial minorities, because ethnicity and race were believed to be related to mental and physical health[53]. Other countries that implemented sterilization policies for people considered to be mentally handicapped included Germany, the UK, Norway, Iceland, Finland, Estonia, Denmark, and Switzerland.

In the case of the United Kingdom, the so-called "Mental Deficiency Law" was introduced in 1913. This law aimed to "control" mental weakness through the registration of mentally ill people and the prohibition of marriages between healthy individuals and mentally ill

[51] Sandel, Michael (2007) *The case against Perfection.* United States, Harvard University Press, p: 66.
[52] Buchanan, et al. (2000) *From chance to choice: genetics and justice.* United Kingdom, Cambridge University Press. pp: 104-105.
[53] Parra, Jesús (2018) "Racismo y bienestar: la hibridación del movimiento eugenésico", *Revista de Historia Contemporánea,* vol. 17, pp: 211-233.

individuals. At the same time, the Ministry of the Interior was given the power to include in this law individuals who were in extreme poverty, lacking basic education, among other reasons, despite not suffering from mental illness[54].

In the first half of the 20th century, the vast majority of geneticists, physical anthropologists, and biologists of high prestige were intimately involved in these eugenic programs. Professionals who had the aim of increasing the birth rate of the supposed "best" and limiting the reproduction of the "unwanted" made an argument that the social and economic costs of caring for those suffering from mental or hereditary illnesses, alcoholics, and criminals were great enough. This was an argument that the governments of the time liked very much.

1.3.2. Eugenics in Germany

One of the most important cases of eugenics in Europe was in Germany, where eugenic policies were taken very much into account. As it was mentioned above, in 1923, the *Chair of Racial Hygiene* was created in Munich, held by Fritz Lenz, a German geneticist and member of the National-Socialist party. Four years later, in 1927, the *Kaiser Whilhelm Institute for Anthropology, Human Heredity and Eugenics* was established in Berlin, headed by the anthropologist and conservative nationalist Eugene Fischer, who, together with the *Chair of Racial Hygiene* in Munich, set a new course for racial hygiene studies in Germany. In this center directed by Fischer, as well as in other centers in the United States, work was done either with information on different aspects of human heredity from medical records or by making family studies and constructing pedigrees in selected populations, be they rural, urban, among others[55].

Hitler paid attention to the eugenic policies being pursued in California and to the eugenic laws in the United States, to which he referred in *Mein Kampf*[56].[57] With his accession to power in 1933, eugenic research was pushed forward with greater vigor. The *Kaiser Whilhelm Institute for Anthropology, Human Heredity and Eugenics* aimed to investigate diseases such as tuberculosis, diabetes, mental illness, the inheritance of criminality, and cross-breeding, with special emphasis on the crossing of Jews and Aryans. The Führer's government gave resources and financial support to eugenic research institutions in order to achieve the goals of the Third Reich. With studies on behavior, intelligence, or race, the Nazi government intended to base its social policies. Such studies were always full of class and racial prejudices[58] .

Among the eugenic measures applied in Nazi Germany were: prohibition of marriages between people of healthy heredity and people with a family history of certain diseases,

[54] Parra, Jesús (2018) "Racismo y bienestar: la hibridación del movimiento eugenésico"
[55] Barahona, Ana (2005) "Galton y el surgimiento de la Genética Humana", Ludus Vitalis, 23, pp. 151-162.
[56] Black, Edwin (2003) "Eugenics an the Nazis - The California Connection" [online] *SFGATE* https://www.sfgate.com/opinion/article/Eugenics-and-the-Nazis-the-California-2549771.php [accessed 4 October 2021].
[57] See also: (1) Black, Edwin (2003) *War Against the Weak*. (2) Kühl, Stephan (1994) *The Nazi connection: Eugenics, American racism, and German National Socialism. United States*, Oxford University Press.
[58] Barahona, Ana (2005) "Galton y el surgimiento de la Genética Humana", Ludus Vitalis, 23, pp. 151-162.

aversion to homosexuality and abortion because, according to German eugenicists, it endangered reproduction[59], and forced sterilizations of people mentally or physically considered "unfit"[60]. Similarly, *Aktion T4,* which was a secret program of extermination of people with mental disabilities or deficiencies considered incurable, was also applied as a eugenic measure. This program was disguised under the term "euthanasia" and was intended to give these patients a "merciful death" after an insightful diagnosis[61].

As a result of these policies, during Führer's rule, 400,000 people were sterilized in order to prevent diseases, considered as such, like alcoholism, insanity, and schizophrenia. The Nurenberg Laws of 1935, whose nature was racist and anti-Semitic, were promoted, which aimed to "clean the German population of undesirable elements"[62]. As a result of these laws, forced emigration measures for Jews were enacted in 1938. The Nazi government provided resources to eugenic research institutions, and therefore, following its studies of races and population groups, their behavior, and intelligence, the Nazi government founded its social policies, full of prejudices towards different classes or races.

1.3.3. Eugenics in Spain

In our country, eugenics developed in the form of positive eugenics due to the importance of Catholicism. Likewise, in Spain, during the dictatorship of Francisco Franco, a mental hygienist movement developed alongside positive eugenics, which sought and investigated mental illnesses intending to eliminate them. In the same way, this movement sought to protect the mental development of boys and girls so that their faculties would be directed towards normality, to protect them from supposed pathological perversions due to heredity. Some inherited pathologies pointed out by Spanish mental hygienism were, supposedly, debauchery, alcoholism, sexual excesses, among others. For this reason, it was necessary to advise adults on the selection of a partner, the exercise of a profession, social behavior, being all of this aimed at reproduction and the formation of healthy offspring[63].

In Spain, through various documents, books, publications, conferences and speeches, attempts were made to promote conscious, hygienic and eugenic marriage, with the aim of improving the Spanish race. Within the promotion and development of eugenics in Spain, two authors stand out: Gregorio Marañón and Antonio Vallejo-Nágera.

[59] Hunt, J (2001) "The Abortion and Eugenics Policies of Nazi Germany" [online] Lifeissues https://www.lifeissues.net/writers/air/air_vol16no1_2001.html [accessed 5 October 2021].
[60] Parraj, Jesús (2019) *La «Mejora Moderada» como Alternativa a las Propuestas Bioconservadora y Posthumanista de Mejora Humana.* Spain, University of Murcia, pp: 92-102.
[61] Friedlander, Henry (1995) *The Origins of Nazi Genocide: From Euthanasia to the Final Solution.* United States, University of North Carolina Press. pp: 67-68.
[62] Barahona, Ana (2005) "Galton y el surgimiento de la Genética Humana", *Ludus Vitalis,* 23, pp. 151-162.
[63] Vallejo-Nágera, Antonio (1934) *La asexualización de los psicópatas*. Spain, Ediciones Medicina, p: 6-7.

Gregorio Marañón and Spanish eugenics:

Firstly, Gregorio Marañón (Madrid, 1887-1960), who was an endocrinologist, historian, and writer, placed special emphasis in his proposal on sex education and marriage, as well as on the economics of marriage.

Within marriage, Marañón placed special emphasis on the fact that it should take place at an early age for the couple, with the economy as a key factor, because it was supposed to be a guarantee of health, care, and education for the offspring[64]. According to Marañón, in the marital union, money even has a major biological significance, this is, money itself becomes something that marks us when choosing a partner. In other words, he considers that money, in the biological sense, is equivalent to strength, well-being, and ease of raising offspring.

On the other hand, he argued that love is not the ideal criterion for choosing a partner for marriage and offspring. In fact, he considered that being in love is a bad advisor for marriage, since he understood love as something blind, and even as something anti-eugenic. For an event as important as marriage, better guidance should be sought[65].

As for the roles of the couple in marriage, Marañón made a clear distinction between the roles of women and men. For him, a married woman with offspring should not have a job outside the home, while a man should work day in and day out to support the family. On the other hand, women who did not have families and did not participate in reproduction should be allowed to work. Therefore, the reproduction and care of offspring go against women's work outside the home. It is something incompatible. In his words, in marriage, the man was a motor, muscular and psychic, provided in an almost accessory way, with a generative organ, while the woman is a great generative mechanism endowed with exquisite sensitivity to react to the environment, for the benefit of the fruit of that generation[66]. Men and women had to work at complementary tasks in order to give rise to better generations.

In addition to the differentiation of roles, Marañón also considers that, in marriage, sexual differentiation is fundamental, this is, to be men and women in all their fullness, to have a differentiated gender, a firm predominance of the personality of the sex that has been given in us over the sex that has not been given in us. Therefore, a man must behave in a manly way and a woman in a feminine way. Likewise, these behaviors, as well as the roles of man and woman, must be taught from father and mother to son and daughter, the parents being the best for this task. Therefore, he rejected homosexuality[67] , and strongly supported heterosexuality with marked gender behavior, as he considered that the improvement of the Spanish race depended on this heterosexuality, and therefore it should be carried out properly.

[64] Ferrándiz, Alejandra; Lafuente, Enrique (1999) "El Pensamiento Eugénico de Marañón" *Asclepio,* Vol LI-2, p: 133-148
[65] Marañón, Gregorio (1928) *Tres ensayos sobre la vida sexual.* Spain. Editorial Espasa-Calpe, p: 64
[66] Ibid. p: 137
[67] In addition to transgender and transsexuality.

Antonio Vallejo-Nájera and Spanish eugenics:

Antonio Vallejo-Nájera (Madrid, 1889-1960), physician and professor of psychiatry at the University of Valladolid, became head of Franco's psychiatric services. Like Marañón, he also focused on positive eugenics and marriage. In Vallejo-Nájera's case, marriage was to be Christian and sacramental, with indissolubility as a feature to be emphasized. In other words, marriages were to have the character of religiosity, permanence, fullness, and legality. Firstly, the character of religiosity insofar as marriage is a union considered by the Church as a divine and sacramental institution. Secondly, the character of permanence in that it is a husband-wife union that is forever. Thirdly, it has the character of fullness in that it is a psycho-physical union. Finally, fourthly, the character of legality because marriage is a moral love sanctioned by law[68].

However, Vallejo-Nájera, unlike Marañón, considers love to be an indispensable condition to be taken into account in marriage[69]. This is because love made it easier to achieve a better family life and a greater fulfillment of marital duties for the betterment of the Spanish race. While Marañón saw love as something blind, Vallejo-Nájera considered that this something blind is our own sexual instinct, arguing that it is an insufficient psychic force to carry out a marriage. He also argued that within marriage, there must be a spiritual interpenetration and a fulfillment of biosocial goals, as well as sexual fidelity, social union, and physical health. It is worth noting that for him race hygiene also implies moral hygiene, which leads him to consider that race hygiene is the work of moralists[70]. In other words, Vallejo-Nájera, with his idea of eugenics, thought that by improving the fittest beings, undesirable traits such as selfishness, perversion or deceit would be suppressed. For this work, he argues that morality is a necessary factor. This morality must be a traditional morality, carried by the hand of national-Catholic spiritualism.

Finally, another important aspect of her proposal in Spanish eugenics is the importance he attaches to the environment in order to give rise to the desired being. Vallejo-Nágera argues that the environment in which the new Spanish generations should develop is one in which there is a correct sexual education. To carry out this form of education, prostitution, harassment in the form of street compliments, and "donjuanismo"[71] must be eradicated. For this work, both parents and educators must have vast sexual knowledge to teach children to go against their own impulses, coming from their instinct.

1.3.4. Eugenics in America in the 20th century

As in Europe, eugenics reached its highest point in America at the beginning of the 20th century. During the 1920s and 1930s, several countries in this continent took steps towards

[68] Vallejo-Nájera, Antonio (1938) *Eugamia: Selección de Novios.* Spain, Editorial Española S.A. p: 2
[69] Ibid. p: 2-3
[70] Vallejo-Nájera, Antonio (1938) *Política Racial del Nuevo Estado*. Spain, Editorial Española S.A. p: 12-13.
[71] Ibid. p: 57-58

the formulation of eugenic laws. Among the countries affected were Canada, several states in the United States, Cuba, Brazil, and Mexico.

In the case of Cuba, as in many other countries, Galton's ideas came to be known and put into practice. In the second half of the 1930s, eugenic campaigns took place in the Caribbean country until 1959, from which peasants, workers, aboriginal populations, and marginal ethnic groups received, as it can be assumed, few benefits[72]. On the contrary, eugenics in Cuba aimed at quite radical socio-political and economic changes. So much so that eugenics was even taught in universities as a subject of study, being one of its most prominent promoters Dr. Arístides Mestre y Hevia (1865-1952), a member of the Academy of Medical, Physical and Natural Sciences of Havana[73].

As for Brazil, in 1929, the physician Renato Kehl founded the *Boletim de Eugenia*, in line with the eugenic model that the South American country was adopting at the time. A model which, unlike the Spanish model, differed from hygienist and sanitarist ideas, and focused more on negative eugenics. Likewise, a "visceral" relationship between agriculture, genetics, and plant and animal breeding was advocated, suggesting that the success of Mendel's laws in agriculture implied the possibility of breeding in humans[74]. Thus, the sterilization of individuals considered as "degenerate", whether due to causes such as biological diseases or alcoholism, and the "whitening of the population", this is, the reduction of the Brazilian black population, related to the African slaves of the 19th century, in favor of the white population, associated with culturally and biologically superior individuals, were advocated[75].

On the other hand, in Mexico, in the state of Veracruz, a eugenic regulation was developed and applied, which began in 1932, known as the "reglamento de eugenesia e higiene mental". This regulation defended the sterilization of human beings considered "undesirable", thus referring to those, according to the regulation, idiots, sick, alienated, degenerate, demented, among others, who from the perspective of the Section of Eugenics and Mental Hygiene possessed an incurable and transmissible scourge by inheritance. In the same way, the Section of Eugenics and Mental Hygiene was granted the right to consider whether a criminal should be sterilized or not and to disseminate in the state the appropriate scientific information that was convenient and reachable to the masses and working classes[76].

[72] García, Armando; Álvarez, Raquel (1999) *En busca de la raza perfecta: eugenesia e higiene en Cuba,* Spain, Consejo superior de investigaciones científicas. p: 22.
[73] Ibid. p: 31
[74] Arantes, Paula; Wegner, Robert (2014) "De Plantas y Hombres: Cómo los Genetistas se vincularon a la Eugenesia en Brasil (Un Estudio de caso, 1929–1933)" [online] *Asclepio* https://asclepio.revistas.csic.es/index.php/asclepio/article/view/607/750 [accessed 13 October 2021].
[75] Parra, Jesús (2018) "Racism and Welfare: the hybridisation of the eugenics movement", pp: 211-233.
[76] For more information, see "Reglamento de Eugenesia e Higiene mental", signed by Secretary of Government Miguel Aguillón Guzmán http://dns.veracruz-programa.gob.mx/opg/Guia2/paginas/reglamentos/5.html [accessed 6 October 2021].

1.3.5. Eugenics in the United States

In the US, eugenic principles found a way to gain prominence in professions where human evolution was being studied, such as lawyers, teachers, doctors, etc. In 1910, Davenport, mentioned above, founded the Eugenics Records Office (E.R.O.) at the Carnegie Institution in Washington. This office would later be recognized as the propaganda and dissemination office of the eugenics movement. Davenport, unlike biometricians such as Pearson, applied Mendelian principles in his research, which led to two major projects: one devoted to the study of heredity and the other to evolution. In addition, Davenport argued that the frequent traits in a family should have a biological basis that could be explained through Mendelian laws because traits such as mental and behavioral traits followed hereditary patterns[77].

The E.R.O. organized activities related to eugenics, such as summer courses, where students from various study centers were trained to conduct surveys and collect data for the statistical study of the American population from a eugenic point of view. Research stays for university professors and lectures on the eugenics project were also offered. Even a data bank and records of the results of population surveys were created.

This foundation collected a significant amount of data on family trees. (It is worth noting that decades later, in 1972, the US Senate revealed that sterilizations of black and poor women had been carried out in the US without their consent or even their knowledge[78]). Among Davenport's main collaborators in E.R.O., one of the most important was Harry Hamilton Laughlin[79] (who was also the superintendent of the E.R.O.), who was convinced that the influx of immigrants was a danger to the American population. For this reason, Laughlin promoted the implementation of immigration restriction laws and was an activist in favor of the eugenics and sterilization project. He also defended the separation of the mentally ill and their confinement in institutions as a necessity to prevent criminality.

Years after the founding of E.R.O., the *Eugenical News* magazine was founded in 1916 and served as an organ for the dissemination of the eugenics movement. At that time the movement already had members in California, Chicago, Utah, and Minnesota, as well as in other states. By 1914 more than forty institutions were offering eugenics-related courses in biology, sociology, psychology, and genetics.

As can be seen, one of the main concerns of American eugenicists was immigrants from the Middle East and Latin America, because they were blamed for the moral and physical deterioration of the American population. These immigrants were seen as people of low intellect, lower than the average American. As such, they were seen by American eugenicists as a threat to society. In order to prevent these groups from furthering the deterioration of

[77] Barahona, Ana (2005) "Galton y el surgimiento de la Genética Humana". p. 8.
[78] Ward, Martha (1986) *Poor Women, Powerful Men: America's Great Experiment in Family Planning.* Michigan, Westview Press, P. 95
[79] Harry Hamilton Laughlin (1880-1943) was a professor of history interested in eugenics and genetics. He was one of the most active members of eugenic politics in the United States. One of his most important publications was *Eugenic Sterilization in the United States* in which he presented a record of the activities carried out by the eugenic sterilisation programme in the United States.

American society, immigration restriction laws and sterilization laws were implemented in several states[80] .

Racial and immigration factors were taken into account in sterilization programs. In California, for example, at least 10,000 people were sterilized between 1909 and 1929. The individuals sterilized were persons considered insane (including psychopaths); criminals and delinquents; epileptics; alcoholics (including drug addicts); individuals with tuberculosis, syphilis, leprosy, and other chronic or infectious diseases; blind (including cross-eyed), deaf, deformed and disabled persons; dependent persons such as orphans, vagrants and the poor[81]. These people came from asylums, orphanages, psychiatric hospitals, and prisons.

One of the most prominent eugenicists in the American eugenics movement was psychologist Henry Herbert Goddard (1866-1957). Goddard played a very important role in clinical psychology. He introduced intelligence tests and in 1914 became the first American psychologist to testify in court to limit the criminal responsibility of those deemed unintelligent. However, despite being a convinced eugenicist, he was not clear that the feeble-minded should not have offspring, which led him to hesitate to promote forced sterilization laws, although he advocated segregation in colonies. Goddard advocated experimental work in psychology, as he did for the study of mental minors at the *Vineland Training School for Feeble-Minded Girls and Boys* in New Jersey. Furthermore, he considered that feeble-mindedness was an underdeveloped state of mind in which essential moral factors such as an understanding of right and wrong or self-control were lacking, leading a person to commit acts of criminality, indigence and prostitution[82].

Goddard aimed to demonstrate that the tendency of the mentally ill to commit crimes was caused by hereditary factors. To this end, he conducted one of the most interesting studies in American eugenics: the study of the so-called Kallikak family[83]. This study allowed him to establish that many of the members of this family tended to be mentally retarded. Goddard's plan was to analyze the relatives of Deborah Kallikak, an 8-year-old girl in an asylum for the mentally ill in Vineland. The girl's great-great-grandfather was Martin Kallikak, a man from a good family, who had an out-of-wedlock relationship with her mentally retarded great-great-grandmother, according to her study. The family's descendants, according to local records, numbered 480, of whom 143 were mentally retarded, 46 normal, and the rest of unknown mentality. Among them were also at least 36 cases of prostitutes, alcoholics, epileptics, or criminals. On the other hand, Martin Kallikak married a woman of honorable family tradition. The descendants he had with this woman were people with professions such as doctors, lawyers, teachers, or artists. With this research, Goddard would show something that Galton had already investigated: that physical or personality defects also ran in families

[80] Similarly, regulations were also applied to European migration. Germans, Slavs and Scandinavians were given preference over Latin Americans.
[81] Villela González, María Alicia (2014) "Francis Galton y la eugenesia en los Estados Unidos". *Anthology of Philosophy and History of Science,* chap. 27, 531-544. p. 538.
[82] Barahona, Ana (2005) "Galton y el surgimiento de la Genética Humana". p. 8
[83] In order for the girl to remain anonymous, Goddard invented the surname Kallikak, from the words kallos "good" and Kakos "bad". There is a novel on the subject entitled *Kallocaina*, published in 1940 by the Swedish writer Karin Boye.

or abounded in certain families as they were hereditary[84]. Goddard's studies were published in 1916, in his book *The Kallikak Family. A Study in The Hederity of Feeble*[85].

In conclusion, eugenics in the United States linked to and expressed the social, moral, and ideological values of the dominant classes and groups. Eugenics in this country aimed to maintain the social order, and it legitimized that the poor were poor because of inherited morals, not for economic and social reasons, and that the mentally ill were a social burden. In other words, there was a social order that sought to counteract diseases such as alcoholism and drug dependency by sterilizing those who suffered from them. Racism was often linked with the eugenics movement, for it was easy to identify the worst specimens as "other races", as it was reflected in the Nazi program, as well as immigrants. In this way, eugenics became an ideology of "purity" supported by a "prophylactic" social policy.

1.4. Consequences and decline of eugenics

After studying the *Origin of Species* and the mechanism of adaptation and evolution, Galton and the original eugenicists wanted to apply their knowledge to the salvation and improvement of society. But the road was bumpy, their vision clouded, and the way forward was unclear. Soon there were victims of eugenic ideas.

At the end of the Second World War in 1945, the term "eugenics" fell into steep decline. Society's opinion of the practices that originated from eugenics, following the Nazi holocaust and the racial prejudice it provoked, was very negative, which led to its great discrediting as a social science project. Eugenics became a taboo subject, and the mention of it always implied a reference to the horrors witnessed in Nazi extermination camps, and to immoral experiments on children. However, this was not the end of the term that saw its birth in Galton's writings. From the 1950s onwards, both in the UK and the US, the field of contemporary human genetics began to develop, in medical genetics and molecular genetics[86]. One of the bases for understanding biochemical variations, and the impetus for the study of human chromosomes or karyotypes, was the discovery of DNA by James Dewey Watson and Francis Harry Compton Crick. Later, in 1956, Joe-Hin Tjio and Albert Levan in Sweden showed that the human genome has twenty-three pairs of chromosomes and, in 1959, Down's syndrome was found to be caused by a chromosomal abnormality in the twenty-first pair, which had three copies instead of two. Since this time, the knowledge developed by human genetics has been scientific and being used in medicine.

Advances in genetic science and medicine led in turn to new ethical questions, and new ways of projecting the desire for human enhancement through heredity. In 1974, Joseph Fletcher, an American bioethics professor, published the book *The Ethics of Genetic Control: Ending Reproductive Roulette*. This book deals with ethical questions about modern genetics, as well as a defense of reproduction through genetic engineering, in which future parents have the

[84] Villela González, María Alicia. "Francis Galton y la Eugenesia en los Estados Unidos". pp. 540-542.
[85] Ibid. p. 540
[86] Barahona, Ana (2005) "Galton y el surgimiento de la Genética Humana". p. 10.

power to decide whether or not to apply new technologies to the genetic inheritance of their offspring. The old eugenics was dead, but after the release of this book, the foundations were given for the emergence of a new eugenics. This new eugenics was different, with an individual rather than a social approach, and with the characteristic of leaving future parents freedom for making use of its proposals or rejecting them. Thus begins the rise of liberal eugenics.

2. THE SO-CALLED LIBERAL EUGENICS

During the 1970s, thanks to Fletcher's *The Ethics of Genetic Control: Ending Reproductive Roulette*, published in 1974, new eugenics began to emerge. However, it was not until 1998, when the Australian philosopher Nicholas Agar published the article "Liberal Eugenics", that this new eugenics became known as "liberal eugenics". In this chapter the concept of liberal eugenics, its meaning, connotations, and purposes will be studied.

2.1. Nicholas Agar and the definition of liberal eugenics. Meaning and objectives

Liberal eugenics, formulated by Nicholas Agar, is a eugenics in which future parents have reproductive freedoms to choose the traits of a future child. A key feature in understanding liberal eugenics, adds Agar, is the neutrality of the state, whereby future parents will be free to choose whether they want to genetically modify their future child or not. In this way, liberal eugenics can be separated from older forms of eugenics such as Nazi eugenics, because in liberal eugenics there is no coercion in reproduction, and individuals are totally free to have the partner they want and to choose whether they want to have offspring or not. In order to carry out the desired modifications or selections in the offspring, parents count on genetic engineering and the so-called breeding technologies.

As it can be seen, from the beginning Agar tries to differentiate liberal eugenics from the old eugenics, as he considers that the concept of eugenics has become infamous after the Nazi holocaust. Agar calls the eugenics of the past "authoritarian eugenics", which must be rejected and replaced by liberal eugenics, in which the state will allow the development of technologies, and parents will be informed about which beings can be created through these technologies[87].

Liberal eugenics allows not only one, but several visions of what would be an excellent inheritance, as well as "limited freedom" for parents to choose the physical and psychological traits of their children, always under the supervision of scientists of enhancement technologies, which are the future technologies that will function as a means to have enhanced offspring with the traits desired by the parents. These will be discussed later in the third chapter. As can be seen, in liberal eugenics there is a pluralistic view on the meaning of "fit". In other words, it is not necessary for a human being to have certain genetics in order to become a fit being, but there can be human beings with diverse genetics and all of them can become successful in their respective lives.

Agar argues that there are different views on how broad the freedom of parents should be. For example, Watson, one of the discoverers of the molecular structure of DNA, sees no problem with the selection of traits such as sexual orientation and musical ability, if their

[87] Agar, Nicholas (2004) *Liberal Eugenics. In defense of Human enhancement. United* States, Blackwell Publishing. p: 5

genetic basis can be established. He even argues that if the gene that determines sexuality is found and a woman decides she does not want a homosexual child, she should be allowed to make that decision[88]. On the other hand, less enthusiastic liberals argue in favor of limiting these individual choices. This is because citizenship could end up being designed according to a dominant set of values, and the new eugenics would become the old eugenics. In Agar's case, he argues that respect for life and the life plans that future people may have can limit parental choices, which is a major difference between old eugenics and liberal eugenics. In other words, Agar, in his position on the freedom of parents to select the characteristics of their children, defends a view that falls somewhere between transhumanism and the opponents of enhancement technologies.

Transhumanism can be defined as the set of life philosophies that seek the continuation and acceleration of the evolution of intelligent life beyond its currently human form and human limitations through science and technology, guided by promotion of life principles and values[89]. This ideology has its roots in the 1923 article "Daedalus" written by the British geneticist and biologist John Burdon Sanderson Haldane (1892-1964), which speculated about how humans could evolve hand in hand with science, through scientific advances such as transgenic foods, surrogacy or artificial wombs[90]. However, the term "transhumanism" first appeared in the article "Transhumanism", published in 1957 by the British biologist Julian Huxley, in which he argued that the human species can transcend itself and account for new possibilities of and for its nature[91].

An important goal in transhumanism is to make individuals of the human species become in those beings that are referred to as "posthuman". In transhumanism, the term "posthuman" refers to a person whose basic capabilities radically surpass those of the average human being, and it could be the beginning of a new species. Posthumans will be anticipated by the intermediate state of transhumans, who are beings who have benefited from enhancement technologies, but are reminiscent of a human being[92].

However, there are various ways of looking at the concept of the posthuman. Already in the 1990s, Donna Haraway, in her work *Simians, Cyborgs and Women,* points to the importance of the way in which humans are involved in relationships with science and technology, and with the environment and other animals. Similarly, feminist and gender researchers Rosi Braidotti and Cecilia Åsberg argue that a posthuman comes to designate a set of intentions to reconceptualize the relationship between technology and human personification[93]. However, for them, unlike the transhumanists, the posthuman need not be the product of genetic modifications but can be the product of environmental modifications. Thus, the

[88] Agar, Nicholas (1998) "Liberal Eugenics" *Public Affairs Quarterly,* vol: 12. pp: 137-155
[89] More, Max (2013) "The philosophy of Transhumanism" [online] humanityplus.org https://humanityplus.org/transhumanism/philosophy-of-transhumanism/ [accessed 4 July 2021].
[90] Haldane, John (1923) "Daedalus, or Science and the Future" Heretics, Cambridge University.
[91] Huxley, Julian (1957) "Transhumanism", *Harper & Broders,* New York.
[92] Agar, Nicholas (2004) *Liberal Eugenics.* p: 16
[93] Braidotti, Rosi; Åsberg, Cecilia (2018) A *Feminist Companion to the Posthumanities.* Switzerland, Springer. p:7

posthuman would be the individual whose nature and connection to the outside world are modified as a result of the alteration of the environment by science and technology.

On the other hand, opponents of enhancement technologies believe that the important question is not whether the technologies will make us better, but whether they will give place to human beings in the full sense of the word. Some notable opponents are the Japanese-American political scientist Francis Fukuyama, the American environmentalist Bill McKibben, and the American bioethicist Leon Kass.

Therefore, Agar considers that, on the one hand, human enhancement is not incompatible with a meaningful human life, but, on the other hand, he does not approve of a total fusion between humans and technology, as transhumanists might do, and even less the use of technological means to physically and psychologically enhance our offspring without certain conditions. Later, in the fourth chapter, we will discuss the limits of the use of genetic engineering.

2.2. The first approaches. Joseph Fletcher and the improvement of reproduction.

While it was Nicholas Agar who originated the concept of "liberal eugenics" in a 1998 article, the ideas that give rise to this concept can be traced back to the 1970s in the work of the American bioethicist Joseph Fletcher.

Over the last few decades, ethical issues have arisen in relation to the most modern scientific technologies, and one of the most notable fields in terms of ethical issues has been the field of human genetics. Fletcher, in his book *The Ethics of Genetic Control. Ending reproductive roulette*, published in 1974, attempts to explore and analyze these issues. However, Fletcher, unlike many philosophers, does not try in his book to problematize the ethical and moral questions against the use of reproductive technologies, but rather to respond to them in an analytical way and arrive at an agreed solution, as he considers that the ethical involves a leap from the initiative to the normative[94].[95]

First of all, in order to make further progress on the issue of genetics in human reproduction, it is necessary first to examine the concepts of ethics and morality and how they are dealt with in these very murky fields. According to Fletcher, morality is what people consider to be right and good, while ethics is the reflection of morality and its rational analysis. For example, a moral question would be: should I terminate my pregnancy? Whereas an ethical question would be: How should I act on my decision to terminate my pregnancy? This is, do I go to a public or private hospital? If I decide not to abort, do I take care of my future child or do I give it up for adoption?[96]

[94] Fletcher, Joseph (1974) *The Ethics of Genetic Control. Ending reproductive roulette.* United States, Prometheus Books. p: XVII
[95] Fletcher tries to explain, with his leap from the initiative to the normative, that ethical judgement involves translating ethical theory into practice, and thus into legislation.
[96] Fletcher, Joseph (1974) *The Ethics of Genetic Control*. pp: XIV-XV.

However, how do we best solve ethical and moral problems? To answer this question, Fletcher invented the term "situational ethics", which refers to the fact that, when dealing with ethical problems, the variables in each case determine what we should do. Thus, the same action is sometimes right, and sometimes wrong, depending on the circumstances[97]. In other words, situational ethics assumes that ethical problems cannot be guided by absolute and immutable commandments, but those ethical solutions to problems depend on the situation in which we find ourselves.

Advances in reproductive medicine and genetics are quite rapid. Traditionally, when we think of human reproduction, we think of heterosexual reproduction in which the new individual develops inside the woman's womb. However, this may change with the new technologies, and with it our morality, which has already happened. Formerly, says Fletcher, a couple's conception of a child was like playing a game of luck roulette, this is, a random leap of chance in which, at best, they had some limited control over how many children they wished to have. However, with the help of new reproductive technologies we can make the leap of being able to control the physical and genetic quality of our children, so that to some extent we could in the future be designing our own offspring. Humans could then be designing themselves. This is why Fletcher, in his book, speaks of the concept of "homo-autofabricus"[98].

However, it also points out that not everything that is scientifically possible is good or desirable. One thing is what something is, and another thing is what something should be. Facts are one thing and values are another. Fletcher, in his work, arrives at an assumption also arrived at by the French biochemist Jacques Monod: wisdom "forbids any confusion of value judgments with judgments arrived at through knowledge"[99].

For this same reason, when making use of genetic engineering, we must avoid two ethical errors. The first is to believe that if we can do something, then we must do it (this is, the fallacy of capability). The other is to believe that because we can do something we will do it (this is, the fallacy of necessity or inevitability). It is worth noting that there is a third fallacy: the fallacy of growth, that is, the belief that the more people the better. This is not true. We can even see it in the population when destructive effects appear in the increase of people in a certain area. Increase is not synonymous with progress. Our situation is therefore Promethean, as we play God, and use our knowledge to improve the human condition.

Fletcher argues that we are in the first stage of the biological revolution. Watson told a committee in Washington in 1971 that in vitro fertilization would be a common method of reproduction within a decade or two, and that cloning would be a fact of life in 20 to 25 years. The latter was somewhat fulfilled with the creation of Dolly the sheep in 1996. Revolution, Fletcher argues, is only a state of evolution in which the rate of change happens abnormally fast, and what emerges from embryology and genetics is very revolutionary. Likewise post-conception, this is, prenatal monitoring, is now possible thanks to safe medical abortion, and when genetic surgery and therapy achieve their goals, then we will have control over the

[97] Fletcher, Joseph (1974) *The Ethics of Genetic Control*. p: 30
[98] Ibid. p: 4
[99] Ibid. p: XVI

quality of the new beings born before conception. But this is so new that there is no medical code of ethics.

Fletcher points out that we face a new challenge: genetic control and birth technologies. First, we know how to have sex without engendering children, and now we need to know how to engender children without having sex. The idea that life begins with an egg and a sperm would no longer be so true if we could reproduce by other means such as cloning. So sex is no longer entirely necessary to make babies. Babies can now have different origins.

Now that the biomedical arts and sciences can give us the opportunity to improve the quality of our babies, as part of our quality control, Fletcher argues that we should better control the number of children we have. The quality of life depends on the quality of people living together[100]. Now that sex and reproduction are separate, we have two functions, not one, which must be treated by their own values.

2.2.1. Fletcher and the concept of genetic engineering

Genetic engineering is a field of study that encompasses the analysis, understanding, and methodology of new forms of human reproduction. But what do the words "genetic engineering" mean, what do they refer to and what is their purpose?

The *American Medical Assosiation* defines the concept of genetic engineering as everything that encompasses anything that has to do with the manipulation of gametes or the fetus, for any purpose, from any conception other than sexual[101]. The main purpose of genetic engineering is not to improve the prenatal and postnatal disease status of patients, but to make people healthy and disease-free through the practice of preconception medicine. What bioengineers try to do for achieving this goal is to direct rational mutations, this is, mutations given by human hand against accidental mutations occurring in nature. In other words, they aim to control the genetic constitution of people through genetic surgery.

Genetic engineering, says Fletcher, is good when it serves human needs, both for health and happiness. For example, when it is used in agriculture and animal husbandry for human benefit. Furthermore, Fletcher himself considers that there is no "limit" to the use of genetic engineering for human health and quality[102].

When Fletcher talks about genetic engineering, he talks about the importance that sperm banks can have. In particular, he refers in his work to the human sperm (and egg) bank of *Arkansas University*, created in 1953. In this bank, sperm is stored in such a way that it is diluted in a protective liquid and wrapped in plastic, pooled in aluminum containers in liquid

[100] At this point Fletcher makes a laughable reference to Freud, who considered that destiny is marked in our anatomy, taking it for granted that women are baby-making machines. Similarly, he thought that scientific progress is meaningless if it does not allow us to make more babies. Fletcher argues that if he spoke of better babies rather than more babies, Freud could be taken more seriously.
[101] Fletcher, Joseph (1974) *The Ethics of Genetic Control.* p: 39
[102] Ibid. p: 169

nitrogen. Thanks to this, many infants have been conceived with frozen sperm. It is estimated that, during the first 18 years of operation, this bank gave birth to some 65 children, only one of whom had an anomaly, which was the absence of a finger[103].

In most cases, the reason for freezing sperm is that some couples wish to postpone having offspring for two or three years. For others, it is a matter of fertility insurance. The idea of the sperm bank has also been considered as protection against nuclear threats to repopulate humanity. Some would even like to look for celebrity donors. However, the important thing at this point would not be to get the sperm of a celebrity donor, but of his father, because of the responsibility, he may have for the traits of his celebrity child.

As can be seen, bioengineering looks promising at first glance for humanity. However, Fletcher comments that we must bear in mind that, in order to have the desired son or daughter, not everything is derived from the father's or donor's sperm. Here we are talking about the question of sperm and eggs, and how these can be related. In addition, apart from the importance that genetics may have on the new individual, in order for him or her to develop and thus have a promising future, he or she must have a good environment, suitable for him or her. Only with the ideal mix of genetics and environment the desired offspring will be obtained. This last idea is an idea put forward by several authors in favor of liberal eugenics, such as Allen Buchanan or Nicholas Agar, among others. Later on, we will go deeper into the debate about the importance of genetics and the environment.

2.3. Distinctions in genetic engineering

For the analysis of interventions in human reproduction with the help of genetic engineering, it is important to make distinctions in terms of the objectives to be achieved and the cells in which it is to be applied. Firstly, genetic engineering has two possible purposes: therapy and enhancement. On the one hand, therapy consists of an intervention in which the aim is to prevent the new being from being born with defects, whether they are diseases or disabilities. On the other hand, enhancement is the improvement of one or more traits of the new individual so that these traits excel within what is considered normality. In other words, while therapy seeks to prevent the new individual from falling into a social category considered below normal or common because of traits that he or she might develop, enhancement seeks to make the new individual stand out from normality because of his or her traits and abilities.

Therapy and enhancement interventions can have a different impact depending on the cells to which they are applied. Therefore, a second distinction needs to be made: somatic cells and germ-line cells. On the one hand, somatic cells are those cells found in areas of our body such as muscles or our skin, being cells containing 23 paired chromosomes that do not transmit genetic information to offspring. On the other hand, germ-line cells, which would be egg and sperm cells, are cells that contain 23 odd chromosomes and do transmit genetic information to them. In other words, if we perform a genetic engineering intervention in the

[103] Fletcher, Joseph (1974) *The Ethics of Genetic Control*. p: 69

reproduction of future parents and focus on the somatic cells they possess, then this intervention will only affect the child resulting from that reproduction. However, if instead of focusing here on the somatic cells, we focus on the germ-line cells, then this intervention will affect the child resulting from this reproduction, the children of this child, grandchildren, great-grandchildren, etc.

2.4. Forms of genetic intervention. The Daniels and Allhoff versions

Having clarified the distinctions in genetic engineering in terms of purpose and cells to intervene, two different versions of intervention in reproduction presented by two philosophers will be analyzed, Norman Daniels and Fritz Allhoff.

2.4.1. Norman Daniels and the positive and negative genetic interventions

Firstly, the American philosopher Norman Daniels, in a book published in 2000 together with Daniel Brock, Allen Buchanan, and Dan Wikler, entitled *From chance to choice: genetics and justice*, talks about the distinction between positive genetic intervention and negative genetic intervention. The distinction can be seen in chapter four of the book, entitled "Positive and Negative Genetic Interventions". This distinction, he argues, depends on our ability to distinguish disease, disorder, and disability from normal traits and abilities.

Earlier, in the first chapter of this thesis, positive eugenics and negative eugenics were discussed. In negative eugenics, the aim was to reduce the negative effects that reproduction can cause, such as diseases, disorders, among others, by preventing the reproduction of less healthy and less capable individuals, even restricting their reproductive rights, including sterilization. In positive eugenics, on the other hand, the aim was to improve the health and function of the population by promoting reproduction among those with better traits and abilities, so modifications of traditional reproductive practices were carried out, though usually through voluntary measures, such as inspiring people to choose certain partners for marriage and subsequent reproduction through competitions at fairs between families to see who would produce the best offspring. However, Daniels argues that the difference between these two ancient eugenics does not mark any moral line in the eugenics movement, but two perspectives on the same end. In other words, with the distinction between positive and negative eugenics, it is not possible to find a way to differentiate the permissible from the impermissible in reproductive intervention.

For this reason, in *From chance to choice,* Daniels speaks about positive and negative genetic intervention. At this point, it is important to note that in this book the term "genetic intervention" is used in a broad sense to include somatic cell or germ-line cell uses and pharmacological applications of genetic technologies, as well as uses of genetic technology directed towards a family plan.

Negative genetic interventions are those interventions ranging from screening and selective abortions[104] to somatic cell and, more problematically, germ-line cell replacement therapy. In other words, negative genetic interventions encompass both somatic cell and germ cell therapy interventions. On the other hand, positive genetic interventions are those interventions related to the enhancement of normal traits and abilities, either through somatic or germ-line cells[105].

Daniels comments that a number of contemporary discussions assume that negative genetic interventions are morally permissible, while positive ones are not. This is because, in general, negative interventions are generally no different from other medical treatments, whether preventive or curative, for disease or disability, whereas positive interventions relate more, as mentioned above, to the enhancement of normal traits and abilities. There is little moral issue in treating disease, but much controversy over which traits should be enhanced. If this distinction were to translate into a distinction between the permissible and the impermissible, with negative genetic interventions being permissible and positive ones impermissible, then such a distinction would become one of great importance in public policy[106].

2.4.2. Fritz Allhoff, four distinctions

Secondly, Fritz Allhoff, professor of philosophy at *Western Michigan University*, in his 2005 article, "Germ-Line Genetic Enhancement and Rawlsian Primary Goods", makes four distinctions in relation to genetic intervention, naming them from least morally problematic to most morally problematic. First, as the least problematic, would be somatic cell therapy; next would be germ-line cell therapy and somatic cell enhancement; and last would be germ-line cell enhancement.

As it can be seen, Allhoff considers germ-line cell enhancement to be the most controversial intervention of all. While he comments that there will be those who object to the other three categories, these objections, he believes, often reflect theological issues, scientific limitations, or risks involved, being the three most common objections to genetic intervention. However, he argues that, firstly, we live in a society that is becoming less and less religious, and secondly, the risks will be increasingly reduced by scientific advances, which will diminish the second objection. Furthermore, Allhoff says that no liberal eugenics supporter will say that we should make use of enhancement technologies until the risks can be safely weighed.

However, germ-line cell enhancement remains somewhat controversial. A general problem with enhancements, as opposed to therapies, is that the scientific prospects are overwhelming. In other words, therapy may require intervention at a single genetic location, but

[104] Also known as "eugenic abortions", this is a type of abortion that occurs because of the poor condition of the embryo or fetus due to disease or abnormality.
[105] Buchanan Allen, Brock Daniel, Daniels Norman, Wikler Daniel (2000) *From chance to choice: genetics and justice.* United Kingdom, Cambridge University Press. p: 106
[106] Ibid. p: 106

enhancements are much more difficult, as each human trait or ability may be influenced by one or a small group of genes. Moreover, the genes responsible often have an unequal influence on our traits. Therefore, one would have to locate these genes and see their influence on the traits to be improved. This will be a difficult wall to overcome, says Allhoff. But suppose it is overcome. Then what moral objections would remain? We will examine this question in the next section.

2.5. Questions about therapy and enhancement

Earlier we discussed the distinction between therapy and enhancement in the two authors. This distinction sometimes raises many doubts, so it is necessary to make several clarifications.

Daniels comments that in dealing with the therapy/enhancement distinction we must be careful not to confuse this distinction with the compulsory/non-compulsory distinction. In other words, the therapy/enhancement distinction does not serve to, for example, provide a clear guide to the moral boundaries between what is mandatory and what is non-mandatory to provide in health insurance[107]. However, the therapy/enhancement distinction, Daniels comments, can draw a line between services or interventions to prevent, cure, or ameliorate an illness or disability; and interventions that improve a condition seen as normal or normal functioning. This distinction would therefore be very useful in medical or health insurance contexts.

The difference between therapy and enhancement, he also argues, is closely related to the concept of "medical necessity", which has appeared in public and private insurance regulations in the United States and Canada. Here we must understand that, according to Daniels, medically necessary services are those that effectively treat a physical or mental illness, disability, or minimize conditions arising from them[108]. For example, if a child is short because of a growth hormone problem or syndrome, health insurance will cover this need if it is caused by an illness or abnormality, but will not cover it if the child is simply short.

In the course of this section, we will focus on three questions about the therapy/enhancement distinction: firstly, we will look at the relation of this distinction to the permissible/non-permissible distinction; secondly, we will focus on whether therapy and enhancement are really so different; and finally, thirdly, we will comment on whether the therapy/enhancement distinction is really relevant for society.

[107] We have to take into account the context in which Daniels is speaking, which is the context of the United States, where there is no public health care.
[108] Buchanan, et.al (2000) *From chance to choice*. p: 110

2.5.1. Does therapy/improvement coincide with permissible/non-permissible?

As has been seen before, in both Daniels' and Allhoff's versions of genetic engineering interventions, genetic enhancement appears to be ethically controversial. Daniels commented that the distinction between therapy and enhancement, which marks the difference between negative and positive genetic interventions, the former being marked by therapies and the latter by enhancements, seems, at first glance, to pinpoint the difference between the ethically feasible and the ethically unfeasible. On the other hand, Allhoff comments that enhancements, especially germ-line cell enhancements, seem to be quite controversial from an ethical point of view, because the consequences of such enhancements can lead to large social differences, making them accessible only to the wealthy. Therefore, can the distinction between therapy and enhancement coincide with the distinction between permissible and impermissible? Is enhancement impermissible?

First of all, it is necessary to clarify that talking about genetic enhancements is very fanciful, given our current knowledge. This is something that both Daniels and Allhoff point out. Allhoff comments that there are many obstacles to overcome before the full potential of these interventions can be realized, as with therapies. Among these obstacles are our limited knowledge of the human genome and the functioning of individual genes, little knowledge of optimal procedural techniques, and our inability to address, or even produce, the large economic cost of the research and practice that would lead to the desired genetic interventions. On the other hand, Daniels comments that talk of improvements assumes that large gaps in our knowledge and technological capabilities have been filled, which is not yet the case, so we have ample room for improvement in knowledge and skills.

Turning now to the issue that concerns this section, Daniels, in "Positive and Negative Genetic Interventions", points out that the therapy/enhancement distinction does not coincide with the permissible/non-permissible distinction. In other words, not all treatments are permissible and not all enhancements are non-permissible. Now, what would be an example of a permissible enhancement? At this point, Daniels quotes Philip Kitcher in his book *The lives to come,* in which Kitcher points out that a permissible enhancement would be an improvement in the immune system and possibly an intervention to prevent memory loss during old age. These improvements could be very beneficial if they do not pose significant risks. Kitcher's example is interesting because of its analogy with vaccines, which reinforce our immune capabilities.

Similarly, Daniels comments that the fact that a genetic intervention counts as an effective treatment does not mean that we are obliged to include it in our repertoire of permissible medical treatments. Suppose we could treat an abnormality through a somatic cell-directed therapy, with the patient's consent, or through a germ-line cell-focused intervention, for which only parental consent is possible. If this were a case where the germ-line cell intervention would have no additional benefits for the patient (although it might have them for their offspring), then direct patient consent is preferable to parental consent[109].

[109] Buchanan, et.al (2000) *From chance to choice.* p: 154

However, Daniels says that although the therapy/enhancement distinction cannot provide us with a criterion for deciding which genetic intervention is viable and which is not, it is true that sometimes many enhancements will give us problems that therapies will not. When we are dealing with a genetic intervention and we know that the genetic intervention is an enhancement, then Daniels argues that a *Moral Warning Flag* should be raised.

The author identifies three types of warning in this regard:

1) Public goods problems can arise if all parents pursue a single trajectory thought to be best for their offspring. For example, gender selection to prevent a genetic disease is only pursued by families that are not affected by the gender ratio for the next generations. However, gender selection for economic or religious reasons can change gender ratios. These actions are not only morally debatable but can also have a self-defeating effect on society.
2) Pursuing an "advantageous position" through the enhancement of some traits, such as height, may have negative effects because it may be a "self-defeat" for humanity or unfair. If everyone can access height enhancement, it would be a "self-defeat" in that no one gains any advantage from height enhancement since everyone can access it. However, if not everyone has access to height improvement, but only the wealthy, there would be a huge inequality among the population.
3) We generally agree that eliminating disease and/or disability benefits the disadvantaged. However, whether an improvement constitutes benefits depends on the values held by individuals, and sometimes the values of parents do not coincide with the values of their offspring[110].

On the other hand, Allhoff also defends the impossibility of always relating enhancement to something non-permissible. As we saw earlier, he commented that a big problem with enhancements, as opposed to therapies, was their scientific prospects, because in a human ability, we can have the influence of an infinite number of genes. This, he says, will be a big obstacle to overcome in the future. However, if we were to overcome that obstacle, what moral objections would remain? Would it be objections that would claim that enhancements are impermissible? These questions were raised a few pages ago and it is now time to answer them.

On the one hand, as Allhoff points out, there is the objection to the moral permissibility of genetic enhancements, which considers that these practices will inevitably lead to unjust outcomes. In other words, Allhoff, like Daniels, speaks about the danger that only a few rich people will be able to access these improvements, which would create a large gap between the rich and the poor. However, in response to this possible injustice, Allhoff wishes to make a proposal. In his article, "Germ-Line Genetic Enhancement and Rawlsian Primary Goods", he proposes to differentiate between genetic enhancement itself, and its distribution. That is, while the scenario may be unjust, society may adopt another pattern of distribution. At this point, he points out that a proponent of John Rawls' philosophy would say that if upper-class citizens want genetic enhancement for themselves, let them have it as long as they improve

[110] Buchanan, et.al (2000) *From chance to choice.* pp: 154-155

the situation of the more deprived classes. Perhaps the genetic improvement of the few creates a great social product from which everyone can benefit. Or perhaps the genetic improvement of the rich can only be permissible if the rich pay for the genetic improvement of the poor.

In addition to the argument presented above, Allhoff also points out that there are others that can be used to dismiss enhancements, or more specifically germ-line cell enhancements, as impermissible. Some of these arguments come from Erik Parens, a researcher at *The Hastings Center in* New York State.

Firstly, Parens believes that when genetic enhancements compromise important things about human existence, they, in turn, decrease the value of some of the aesthetic values of the human experience. For example, if we could accelerate aging and avoid the period of adolescence as much as possible, or avoid the pain of growing old, we would do so, but Parens sees value in these processes of adolescence and aging, and it would be negative to interrupt them[111]. However, Allhoff considers that many would disagree with this view because the human enhancement of old age is not seen as intuitively bad, either by accelerating it or by lessening the pain it entails, but rather many would see such enhancement as valuable. This case represents, says Allhoff, that enhancement in general terms need not be something categorically permitted or forbidden. Here, in the case of aging, there are presumably moral principles that can help us determine what kinds of genetic interventions should be allowed.

Second, Parens wonders whether genetic enhancement would reduce the value of personal achievements, making them less meritorious. For example, according to Parens, we will be less impressive if we are an athlete who uses steroids to win competitions compared to an athlete who does not[112]. However, Allhoff does not see that genetic enhancements can reduce the value of personal achievements. Firstly, he argues that future generations will always have more resources than past generations and, secondly, this does not make new generations any less meritorious. He also argues that athletes are judged by a standard, which changes over the years, and this is also true of genetics. Some athletes have good genetics, and ancestors who were great athletes as well, and that does not reduce their merit. If the latter is objectively acceptable, then genetic improvement should also be objectively acceptable.

A plausible response to this situation, says Allhoff, would be to make the distinction between natural genetic advantages and unnatural genetic advantages morally relevant. But this discussion is losing sight of something important: most of our talents and abilities have developed through interaction with the environment. One would not say, for example, that a great philosopher has less merit for having gone to the best university with the best teachers. Critics would have to maintain that education and exercise are morally legitimate interventions, whereas genetic interventions are not. To justify this, one would have to argue that the genome is "special", or that education develops natural genetic endowments while

[111] Allhoff, Fritz (2005) "Germ-Line Genetic Enhancement and Rawlsian Primary Goods", *Kennedy Institute of Ethics Journal,* vol. 15, pp. 10-26.
[112] Ibid.

genetic interventions change them. These arguments are not ridiculous, Allhoff argues, but he also defends that they do not seem to be sufficiently motivated. Rather, they seem to be based on the premise that what is natural is good.

Finally, Allhoff comments that another argument that attempts to show that enhancements are impermissible is that enhancements are problematic because they demonstrate the failure of humans to accept our place in nature. It considers that there is a feeling that genetic enhancement is something perverse, that it shows discontent with what human beings are. This line of thinking argues that it is better to accept our limitations and accept what we are before trying to change it. However, Allhoff does not think that this argument undermines the moral legitimacy of genetic enhancement. In other words, Allhoff does not see genetic enhancement, or its goals, as an expression of our dissatisfaction, but rather as an opportunity to improve ourselves. Throughout history, human beings have designed many processes to improve themselves, such as education, training, and so on. So why not try genetic enhancement? Allhoff does not consider that genomes are what make us, or that genetic enhancements are aggressive or ruthless, but rather that genetic enhancements are intended to make us better, something he considers very noble[113].

2.5.2. Are therapy and enhancement so different?

Are therapy and enhancement really quite different, or could we be talking about the same thing? Can the distinction between therapy and enhancement be clearly drawn? Norman Daniels, in "Positive and Negative Genetic Interventions", makes it clear that the distinction between therapy and enhancement, and the moral implications that follow, must be examined for two reasons.

Firstly, as has been seen above, the therapy/enhancement distinction is used for a very different moral purpose in most medical or health insurance contexts. Specifically, if it is used to draw a distinction between mandatory and non-mandatory services. But when we talk about insurance, the mandatory/non-mandatory distinction is not the same as the permissible/non-permissible distinction, and the same is true when we talk about genetic interventions. What is compulsory in insurance is permissible, and what is non-permissible for everyone cannot be compulsory in insurance. Thus, what is not compulsory in insurance may be permissible or non-permissible.

Secondly, and turning now to what concerns this section, the treatment/enhancement distinction itself has been heavily criticized for reasons that need to be taken seriously. To decide whether, for example, the positive/negative interventions Daniels spoke of earlier have implications for public policy (this is, whether it helps to draw moral boundaries), it is important to consider this distinction carefully and see what it rests on. This distinction, however, can be difficult to draw and does not really create a difference between mandatory and non-mandatory, leaving difficult cases where the distinction is very blurred.

[113] Allhoff, Fritz (2005) "Germ-Line Genetic Enhancement and Rawlsian Primary Goods"

The therapy/enhancement distinction attempts to draw a line between services or interventions to prevent, cure, or ameliorate a disease or handicap; and interventions that improve a condition seen as normal or normal functioning. In other words, this distinction is closely related to the concept of "medical necessity", as we saw earlier.

However, Daniels also points out that there are those who believe that the treatment/enhancement distinction should not be made, and that if there is suffering of any kind, then that suffering should be alleviated by medical interventions through health insurance. This, says Daniels, can be a big risk for health insurers, which is why they insist on a diagnosis of illness as a condition for reimbursement. Without such a diagnosis of illness, health insurers run the risk of exposing themselves to so-called "moral hazard".

According to Daniels, "moral hazard" refers to the modification of behavior that individuals experience in light of the incentives provided by insurance coverage[114]. For example, someone with comprehensive fire insurance might seek to profit from insurance companies by setting fire to the house, or by not taking adequate precautions. However, if we can define to an insurance company our normal condition as a disadvantaged condition, then in that situation it would be more willing to take that 'moral hazard'.

As it can be seen, the treatment/enhancement distinction is relevant in that it seems to allow us to distinguish between cases where, whether through health insurance or otherwise, we are obliged to help others, and cases where we are not obliged to help others. Many of us will feel that a person should have health insurance if he or she has to face an operation because of a serious illness. But this situation would be different if that person were to have an operation for cosmetic surgery. However, as we have been saying, there are difficult cases in which the distinction between what is compulsory and what is not is blurred, and thus also the therapy/improvement distinction. Let us now look at one of these difficult cases pointed out by Daniels:

1) Johnny is a short 11-year-old boy with a documented growth hormone deficiency due to a brain tumor. His parents are of average height. It is estimated that Johnny, without growth hormone treatment, will be 1.60 meters tall as an adult.

2) Billy is a short 11-year-old boy with normal growth hormone secretion. However, his parents are very short. It is estimated that Billy will be 1.60 meters tall as an adult[115].

Cases like this, says Daniels, make the treatment/enhancement distinction arbitrary for several reasons. First, both boys will suffer disadvantage if they are not treated, and there is no reason to think that the two different causes that make them short will cause people to treat them differently. Second, although Johnny is short because of a deficiency and Billy is short because of genetics, they are both short and it is not their fault, and they both suffer disadvantages. Third, the preference of Billy's parents for Billy to be tall, as with Johnny's

[114] Buchanan, et.al (2000) *From chance to choice.* p: 112
[115] Ibid. p: 115

parents, is a preference that most people hold, not an extravagant one: it is a response to social prejudice.

This example raises several questions: does the concept of disease underlying the treatment/enhancement distinction force us to treat similar cases in different ways? Are we violating the old Aristotelian requirement that justice demands treating similar cases similarly? Is unequal treatment "unfair" or "unjust"?

Because of these questions, two objections can be raised to the therapy/enhancement distinction.

The first objection is that the therapy/enhancement distinction, as we have been saying, does not have the moral relevance commonly attributed to it. Some conditions, which are not the product of illness or disability, seem to oblige us to provide assistance to people for the same reasons that we provide it for illness. If this is so, then this distinction does not distinguish morally obligatory services from those that are not.

As an example of this first objection, Daniels points out, we have that society should make a woman's abortion process a service covered by a national benefits package as if it were health insurance. However, the reason for including abortions in insurance has nothing to do with treating an illness or disability, since an unwanted pregnancy is neither an illness nor a disability, but rather the result of the normal functioning of the body[116].

The second objection challenges the basis on which the treatment/enhancement distinction was established. In other words, it challenges whether with this distinction we can institute moral distinctions with a certain "circularity". The important issue of this objection is not whether there are biological differences between Johnny and Billy. What this objection challenges is our social construction of illness, which seems to have created a set of values that seem to have pointed out Johnny and Billy in this way.

According to the second objection, it is our norms and values that define what counts as disease, not biological characteristics, and the arbitrariness in these cases comes from an inconsistency applied to our values. In other words, this objection echoes a concern with the positive/negative eugenics distinction: eugenic judgments made about defects reflected value judgments about what counts as a normal or superior trait.

However, despite the two objections mentioned above, is it still possible to defend the continued existence of the therapy/enhancement distinction? Daniels thinks so. He expresses this defense as follows: *our primary justification for considering that a health care service should be something obligatory for society to offer is because it is a reasonably effective treatment for a disease or disability*[117]. In other words, the main reason for arguing that society is obliged to provide people with medical services is that there is an important need

[116] Buchanan, et.al (2000) *From chance to choice.* p: 120
[117] Ibid. p: 121

for the treatment of diseases and disabilities. This reason, on the other hand, is not given in the improvements.

In conclusion, it is necessary to clarify that, according to Daniels, diseases, and disabilities, physical and mental, are interpreted as deviations from the normal functioning of a species-typical organism. The line between illness/disability and normal functioning is therefore drawn in the non-evaluative and relatively objective context provided by the largely constructed biomedical sciences. The moral importance of treating illness/disability can be judged by the impact on our range of opportunities. This range is socially relative, as it is affected by technology, education, health, among other elements.

It is possible to conclude this section, then, with a small insight from Allhoff, who considers that it is not worth challenging the distinction between therapy and enhancement. In his view, an individual may be genetically normal and any intervention would constitute enhancement rather than therapy. However, formally speaking, intervention would constitute therapy. As long as the enhancement/therapy distinction is supposed to be morally relevant, one may question whether the same genetic intervention is more or less morally appropriate depending on the case. Depression can be qualitatively identical in two people, and help is needed in both cases. The therapy/enhancement distinction focuses only on the aetiology[118] and totally ignores the degree of suffering. Therefore, this distinction leaves us with complicated cases where it is difficult to confirm whether a given intervention qualifies as enhancement or therapy, as in the cases of Johnny and Billy.

2.5.3. Does the difference between therapy and enhancement matter?

In the previous section, we noted Daniels' considerations of how the therapy/enhancement distinction was challenged in that it does not distinguish between compulsory and non-compulsory, sometimes leaving the distinction as arbitrary, as in the case of the children Johnny and Billy. In the case of these children we could see that, although they both suffered the consequences of being short, they were not treated equally, because if the medical action is a treatment then it could be covered by insurance, but not if it is an enhancement. However, Daniels comments that if we want a world where there is equal opportunity for all, then we will make an effort so that no one suffers any loss of opportunity in the future, and in the case of Johnny and Billy we appreciate that Billy suffers as much loss of opportunity as Johnny. So we must ask ourselves: why make such a big deal about the therapy/improvement difference, why not focus instead on the life chances that everyone has?

Daniels' goal in this regard is to equalize the life chances of all or, failing that, to ameliorate the disadvantages of the least advantaged. Even some clinicians, the author points out, believe that health care, rather than being marked by the difference between therapy and improvement, should aim to remove the sources of unhappiness from which we suffer and

[118] The science that studies the cause of diseases.

for which we are not to blame. Therefore, health care should give people a chance to be happy, as well as the opportunity for several of them to join together in a single project.

However, at this point, a question arises: can we translate the equal opportunity claim that Daniels talks about to the goals of health care? He answers that this is not possible. But why? We will address these questions later, in the fourth chapter of this thesis.

2.6. Nicholas Agar and intelligence enhancement

In the previous sections we have discussed questions about genetic enhancements, and we have seen how controversial they can be. Among the improvements designed for new generations, such as immunity to disease or increased life expectancy, there is one that stands out above the rest, and that is improved intelligence.

How can we improve the intelligence of a human being? Some authors, such as geneticist and biologist John Burdon Sanderson Haldane, suggest that we can improve the intelligence of human beings through cloning. According to Haldane, the most talented human beings should be cloned, although, in the case of professionals with great intellect, such as mathematicians and scientists, we should wait until they are in their fifties before cloning them. But in the case of athletes, he believes it is better to clone them young, when they are at their peak. On the other hand, he also argues that cloning can be useful for us to extend our life expectancy. For this process, he argues that we should clone centenarians who are in good condition[119]. [120]

Agar criticizes Haldane's position, commenting that by cloning a 50-year-old human, not only could the clone have a similar intelligence to his own, but from the beginning of his life he could have the physical capacity of a 50-year-old. The latter would not be at all desirable, as the beneficial effects of intelligence could be dulled by the painful effects of the cells of someone of that age, and the situation would be worse if we cloned an elderly centenarian. Perhaps, says Agar, the only successful way to clone a 50-year-old well, without fatal consequences for the clone, would be to freeze the embryonic cells. Furthermore, another problem Agar sees for intelligence enhancement through cloning is that we must understand that a clone is not an exact replica of an original human being, unlike what is presented to us in Hollywood movies. In other words, a clone is not exactly the same as its original. Besides, as we will see in the next section, the environment also influences the development of the clone. If the clone develops in an environment that is very different from its original, it will differ more from the original than if it is created in a similar environment, despite being its clone. Later, in the third chapter, we will look more closely at the genetic modification of human beings through cloning.

[119] Agar, Nicholas (2004) *Liberal Eugenics.* p: 17
[120] See also: Haldane, John (1963) "Biological Possibilities for the Human Species in the Next Thousand Years" in: Wolstenholme, Gordon (1963) *Man and his Future,* United States, Little Brown and Company. pp: 337-361.

Another way to pursue intelligence enhancement in humans, in addition to cloning, is genomics, an enhancement technology that, like cloning, will be discussed in more detail in the third chapter. For this task, it would be necessary to find the genes that are related to human intelligence in order to manipulate them. However, this may be more complicated than it seems at first glance, because the genes related to intelligence, according to Agar, may at the same time be related to other characteristics of ours, such as physical or psychological characteristics, which may be distorted by altering the gene. Furthermore, he defends the idea that we do not have one intelligence as such, but several forms of intelligence, and that even sometimes, when we suffer from a disease that affects our intelligence, as in the case of Alzheimer's, scientists are not entirely clear which intelligence is affected by the disease.

Some scientists argue that there is in fact a general intelligence in humans, called "g". Proponents of general intelligence or "g" argue that there is some domain-general cognitive ability that explains function across a wide range of tasks. Differences in "g" explain differences in performance in areas such as mathematical skills, musical ability, or reading comprehension. If this were the valid view of intelligence, then an enhancement program would be favorable, because improving at "g" means improving our performance in many areas without harming any of them.

However, as Agar argues, there is an alternative view that there are multiple intelligences. In other words, in this view, there is a range of different intelligences, each of which modulates actions circumscribed to each area. Musical intelligence will differ from mathematical intelligence, which in turn will differ from social intelligence, and so on. The American psychologist Howard Gardner also defends this perspective[121].

If the latter view turns out to be true, then we should be more careful about improving intelligence. We will have to question which intelligence we want to improve and whether improving one intelligence might cause problems for others. Moreover, dealing with modifications in intelligence means dealing with many genes. According to Agar in his article "Liberal Eugenics", there are between 30,000 and 50,000 genes associated with intelligence[122]. Because of the large number of genes related to intelligence, there are many diseases associated with intelligence. An example of this problem is that a study on the development of intelligence in children has shown that in certain circumstances artistic development interferes with bodily skills, so musical intelligence could, for example, reduce bodily-kinaesthetic intelligence[123].

Therefore, our idea of improving skills, in terms of intelligence, also involves having to choose. For example, the American psychologist Kay Redfield Jamison argues that there is a connection between artistic creativity and bipolar disorder or manic depression. Moreover, she shows us a list of very creative people who at the same time suffered from depression,

[121] Agar, Nicholas (1998) "Liberal Eugenics"
[122] Today, however, this data has changed. According to the newspaper *El Comercio,* there are now estimated to be just over 1,000. This is far fewer than Agar had predicted, but still a considerable number. https://www.elcomercio.com/tendencias/cientificos-estudio-genes-inteligencia-cerebro.html
[123] Agar, Nicholas (2004) *Liberal Eugenics.* p: 107

such as the British poet Lord Byron, the British poet and philosopher Samuel Coleridge, or the Dutch painter Vincent van Gogh. It is believed that treating the depression of individuals such as these would at the same time reduce their creativity. Something similar happens with Aspergers, who have problems relating to others but have an unusual sensitivity to patterns of inanimate nature[124].

So what would be the right thing to do in such a situation? Would it be ethically correct to improve an individual's intelligence at the cost of causing permanent harm? Moreover, could we separate the damage to be suffered from the benefit to be acquired? In other words, could we make an improvement in an individual's intelligence without a cost? Nicholas Agar considers that such suffering might be part of the benefit being constitutive, or perhaps it is simply associated with it. If the suffering is simply associated with the benefit, then genetic engineers might in the future be able to decouple that suffering from the benefit. But if it is constitutive, then separating the two will be impossible. In the latter case, he considers that carrying out intelligence enhancement does not seem profitable.

On the other hand, if a new being will naturally possess a handicap, and at the same time possess a high intelligence associated with that handicap, would it be right for us to genetically modify it to prevent it from suffering from that handicap, even at the cost of reducing one of its intelligences? If we do so, would we not at the same time be reducing the new being's range of future possibilities in its life once it is born? Agar argues that the possibility that making the new being less intelligent, but at the same time without a handicap, may cause it to enjoy certain pleasures in its future life that it would not otherwise be able to. Thus, the new being, without a particular handicap, and without the natural enhancement of a particular intelligence, could develop skills that he or she would not otherwise achieve. Some parents would value these latter skills more highly in their offspring than high intelligence.

Therefore, if the reduction of intelligence can be compensated for, we would not really be talking about a reduction of freedoms. But if the latter claim is wrong, then gene therapy would reduce freedom and should not be allowed. As we can see, in Nicholas Agar these discussions about the moral parity between "natural genetic arrangements" and "genetically engineered genetic arrangements" leave problems unresolved.

2.7. Nature vs Nurture

In the previous sections, it was noted the inherent contrast in the difference between therapy and enhancement in the genetic modification of new human beings. However, in order to have suitable offspring, it is not enough that the offspring are born genetically modified, either through therapy or enhancement. Other factors also influence the offspring to be successful in the future. These factors are those that occur in the child's environment, be it the place where he lives, his home, the people around him, his upbringing, and his education.

[124] Agar, Nicholas (2004) *Liberal Eugenics*. p: 107

We will call the factors that are already included in the child from birth "nature", while we will call the external factors in the environment that have an influence on the child "nurture". According to this, one may ask: what matters more between "nature" and "nurture" for a successful life: is the successful individual something born or made? These factors are in conflict in terms of what is more important for the development of the desired being, and which should predominate.

2.7.1. Nature vs Nurture in Joseph Fletcher

In Fletcher's writings, we can see the confrontation between the concepts of "nature" and "nurture". Fletcher questions whether it is better to move forward with what nature gives us or by educating human inventions: should we try to improve on nature or take it as it is? What should predominate in our life trajectory: human forces or non-human forces? On the latter question, he points out that humanists would defend human forces while naturalists would defend non-human forces. He also questions whether we can treat what nature offers us as something as precious as life itself and, finally, whether life can be sacralized. On the last question he answers no, because, according to him, it is immoral to value life because it is simply life, and therefore sacred. Life can be something that is very close to being sacred, but, he objects, life can sometimes be involved in comparisons and choices. At this point, Fletcher quotes British philosopher Peter Medawar's phrase: nature does not know what is best[125].

When we talk about values and the idea of "quality of life", we do so from an anthropocentric perspective, this is, a human-oriented perspective. In other words, values are values from the point of view of people. However, from a biocentric or nature-oriented view, says Fletcher, there is no interest in values or quality. This is because the advancement of nature is driven by survival in terms of quantity, not quality, in order to compensate for what is discarded, and what dies and is lost.

At this point, it is necessary to clarify the meaning of the concept of "nature" according to Fletcher. He argues that the term "nature" has many meanings, and at the same time practically none. Nature can have many synonyms: essence, creation, structure, constitution, species, and so on. However, from his perspective, the best definition for the concept of nature is: the sum total of things in time and space, the entire physical universe[126]. This means that laboratory fertilization, cloning, or crystal wombs are as natural as love, life, and death.

2.7.2. Nature vs Nurture in Allen Buchanan

In Allen Buchanan's *From Chance and Choice*, the seventh chapter, entitled “Genetic Intervention and the Morality of Inclusion”, also discusses the importance of genetic plus environmental factors in the new offspring.

[125] Fletcher, Joseph (1974) *The Ethics of Genetic Control.* p: 131
[126] Ibid. p: 132

As we have seen in previous sections, advances in genetic technologies raise ethical and moral issues. Often the most valuable genetic knowledge is about the interactions of particular genes with particular environments. Buchanan comments that it is possible that new discoveries in genetics shows that individuals with particular genotypes require particular environments to develop properly, and in certain occasions, the environment for an individual with a particular genotype sometimes could not exist. In other words, the expansion of our knowledge of genetics, rather than helping us with the nature vs. nurture problem, actually complicates it. This is because, instead of asking in the future whether genes are more important than the environment, or vice versa, in achieving the desired offspring, we will ask what combinations of genes and environments will produce the desired humans.

Buchanan would therefore be claiming that knowledge of the functioning of the genes that influence our neural processes leads us to the conclusion that there is no one optimal environment, for example, for reading or writing for all people: individuals and their genotypes may need different environments according to their needs. As a consequence, genetic knowledge could lead us to look for more effective environments, rather than more effective genetic interventions.

At the same time, Buchanan also argues that knowledge about how different genotypes react to different environments could help us overcome barriers to equal opportunities. However, this would lead to problems of fairness. The ideal environment for one genotype could be detrimental to another. Creating an optimal environment for two genotypes at the same time could be impossible or very costly in some cases. If many learn mathematics in one type of environment, but we see that there are a few who in that environment will not learn mathematics as well as the others unless we provide them with a more expensive environment, then what price is society obliged to pay to provide such an environment?[127]

Conflicts such as this can lead to a clash of interests. Knowledge of how different genotypes react to different environments will complicate the design of public health policies. At this point, we should clarify that Buchanan tends to think of the means of public health as universal because there are interventions that are in the interest of everyone in society. In other words, he sees the means of public health as a form of social action that reinforces solidarity. However, genetic technologies may divide us in terms of opinions or application processes, among other things. For example, with what it was mentioned before, we could conclude that it is better for everyone to take a supplement with water, but at the risk of increasing the incidence of cancer in a minority. Similarly, promoting healthy lifestyle programs in public education will be difficult if it is good for some people and bad for others.

Therefore, due to the situations outlined above, Buchanan argues that new genotyping technologies could stigmatize people, even leading to racist attitudes. The fact that there is no obligation to secure social resources for those representing minority genotypes could lead to limited life opportunities in the future. At the same time, knowledge of our genetic

[127] Buchanan, et.al (2000) *From chance to choice.* p: 299.

differences will lead us to confront what Buchanan calls problems of the morality of inclusion. We will spend time on this issue later in chapter four.

Thus, Buchanan warns, as does John Rawls in his theory of justice, that if a section of the population is not able to participate actively in society unless they have a special set of social resources, then that section of the population can and has a right to claim those resources.

Finally, he points out that, according to some moral theories, the larger the minority requiring special attention for health and/or education, the stronger their right to claim a solution. On this occasion, he claims, it should be noted that it is necessary for a theory not to be utilitarian in any strict sense in order to provide space for some consideration of the number of people in that minority[128].

2.7.3. Nature vs Nurture in Nicholas Agar

In his analysis of the influence of genetics and the environment on the new being, Agar examines different schools of thought. First of all, there are those, such as the advocates of genetic determinism, who make the formation of a human embryo an important event for its identity. According to genetic determinists, the formation of the human genome requires every significant characteristic of its own. In other words, genetic determinism is that school of thought which argues that our phenotypical human characteristics are all originated from our genes[129]. However, Agar sees genetic determinism as flawed thinking because it underestimates the influence that the environment can have on us. While it is true that genes can have an important influence on factors such as intelligence, which we discussed earlier, it is not the only factor to be taken into account.

However, genetic determinism has its counterpart: environmental determinism, which argues that our educational and nutritional environment totally determines who we are, while genes do not contribute beyond making us members of the human species. Proponents of this view often express optimism about the power of the education system because it can achieve almost any reworking of human beings[130]. However, Agar suggests that we should avoid the impulse to transfer the dispute between advocates of genetic determinism and advocates of environmental determinism to the picture of the relationship between genes and the environment. Although advocates of these proposals may be opposed to heritable influences and environmental influences, this need not be the case. If we rule out genetic determinism and environmental determinism, what are we left with? As an answer to this question, Agar mentions the interactionist conception of development. According to this conception, traits are essentially genetic, and at the same time, they are essentially influenced by the environment[131]. In other words, a person's intelligence, along with his or her athletic abilities

[128] Buchanan, et.al (2000) *From chance to choice.* p: 301
[129] Agar, Nicholar (2004) *Liberal Eugenics.* p: 27
[130] Ibid. p: 71
[131] Ibid. p: 71

and emotional sensitivity, is the product of an intermingling of genetic influences with uterine, nutritional, and cultural influences.

Interactionism, as far as our development as human beings is concerned, puts pressure on any perspective that deals with how the identity of a human being is formed and how this identity can be linked to the encounter between an egg and a sperm. Agar believes that although genes are important for our development, this does not make our identity more linked to genes than to the environment. However, on the other hand, he also argues that perhaps a person's genes matter more than their environment in terms of identity because of the time at which they acquire them. This is because the environmental factor only affects when the embryo is formed, whereas with genes it happens earlier[132]. This explains why, in genetic modification, a being can be changed into a numerically different being, something that does not happen with the environment, although this depends on what we call "environment".

A study published in the “Journal of the American Medical Association” investigated the effects of breastfeeding on adult intelligence. The study focused on two samples of babies born between 1959 and 1961. They took into account how long the mothers breastfed their babies. They were tested for intelligence, and other possible variables, such as the mother's smoking addiction, were taken into account. The result was that children who had been breastfed for seven and nine months had an IQ six points higher than those who had only been breastfed for one month or less. These statistics, Agar argues, are no coincidence. Docosahexaenoic acid (ADH), which is a fatty acid present in breast milk, is important for the membranes of cells in the nervous system, and hypothetically plays a role in the transmission of signals between neurons[133]. With this experiment, Agar argues that although genetic modifications differ from environmental modifications in that environmental modifications may in principle be reversible, this depends on what we call environment, with the result that in some cases such influences may be as significant and irreversible as genetic influences, despite the timing of the influence, as in the case of breastfeeding.

It should be kept in mind that what matters in the development of a new being is not the time when it acquires the given gene, but the time when the genes start to influence it. Many DNA changes will have their relevant effects only long after the formation of the genome. For example, some geneticists believe that a mutation of the APP gene on chromosome 21 gives an elevated risk of Alzheimer's disease[134]. But Agar says that the major effect of this change if we cure the mutation of that gene, will only appear once the individual comes into existence. The distinction between the time in which the causes of an influence appear, and the time in which those influences operate, apply to our development.

Agar, therefore, concludes that unable to say whether genes or environment are more relevant to us, we are forced into difficult choices. However, we can avoid extreme situations if we

[132] Agar, Nicholar (2004) *Liberal Eugenics*. p: 75
[133] Ibid. p: 113
[134] Ibid. p: 76

agree that both genetic and environmental factors are equally important for our good development.

In the past, some theorists who did not give enough importance to the environment made major mistakes. Authors such as Richard Herrnstein and Charles Murray argued that black Americans were less intelligent than white Americans because of genetic differences. Both Herrnstein and Murray believed that intelligence was hereditary and that liberal ideas about education programs should be abandoned in order to close the racial gap. Suppose, says Agar, that this gap is demonstrated by an intelligence test. Even if it were to be demonstrated in this way, it cannot be clear that whites are smarter than blacks, because scientific accounts of the inheritance of intelligence agree that, as Agar argues, intelligence is not only inherited genetically but that the environment in which the new individual is raised also plays a role.

However, let us change things a bit and suppose now that it is shown that our intelligence comes 90% from our genes and only 10% from the influence of our environment. Agar argues that arguments about the degree of inheritance of a characteristic, or about the extent to which a given characteristic is due to genetic causes, do not say anything directly about individuals, but rather about variations in populations. It is almost certain that the observed variations in intelligences among human beings are the product of differences in both genetics and environment, both in and out of the womb. If human intelligence were 90% genetic, then differences in genes would account for 90% of the variation, while environment would explain 10% of the differences.

Studies of populations, says Agar, tell us about the relative importance of the influences that have shaped them, but say nothing about the effects that may be caused by new influences. However, arguments about the extent to which genetics influences us concern not only the influences we already carry with us today, but also what new influences might do to us in the future. Agar claims that there is no logical, deductive argument about the narrow range of human height, or speed in the 100m sprint, or the task of intelligence tests in real environments, or even what might be achieved if humans developed in different environments. Thus, Agar's conclusion refers to the wide range of environments in which humans could develop successfully[135]. In other words, there is not one, but several possible environments in which a human being can develop a capacity, be it intelligence, strength, or speed, in an appropriate way.

2.8. Conclusions. Three characteristics of liberal eugenics

Throughout this chapter, I have presented an analysis of the meaning of the concept of "liberal eugenics". Its characteristics and objectives have been studied. In the same way, the origin of its conception has been discovered, analyzing the meaning and objectives of genetic engineering and the different ways in which it can intervene in the human being according to the perspectives of different philosophers. The importance of the difference between therapy

[135] Agar, Nicholas (2004) *Liberal Eugenics.* p: 93

and enhancement and the difference between genetic influence and the influence given by the environment has also been studied. From these studies, it can be concluded that there are three main differences between the concept of eugenics and the concept of liberal eugenics.

The first difference between the two is in the state. In the old eugenics, its advocates had a collectivist view of the state, so that the good of the state was sought rather than the good of the individual. This often led to the defense of the state as an authority to be obeyed by the citizenry. Francis Galton, in the early 20th century, aimed to spread and institutionalize eugenics so that it would be reflected in the laws of every country that adopted it (to the extent that it was adopted as a new religion). Thus, the old eugenics demanded absolute fidelity on the part of the citizenry. On the other hand, the advocates of liberal eugenics defend an individualistic stance, so they prioritize the good of the individual more than the good of the state. Therefore, this new eugenics does not demand absolute fidelity on the part of those who adopt its criteria. In other words, in liberal eugenics, the state maintains a neutral role, and future parents are allowed to decide freely whether or not to modify their future offspring through genetic engineering.

The second difference lies in the importance given by the two eugenics to the environment as a factor influencing the improvement of the individual. Several of the defenders of the old eugenics tend to favor genetic determinism, arguing that individuals are what their genes dictate and that genetics is more transcendent than the environment, with the environment often being of little or no relevance. These ideas are reflected, for example, in the writings of Gregorio Marañón, who went so far as to argue that the economic status of each individual is biologically significant when selecting a mate. Galton himself even attempted to demonstrate that criminals had particular phenotypic characteristics. However, the advocates of liberal eugenics, as Nicholas Agar points out, favor the interactionist conception of development. In other words, advocates of liberal eugenics argue for the importance of both genetic and environmental factors equally in getting a new human being on the right track.

The third difference lies in the paths that the two eugenics consider for someone to become prominent. The old eugenics advocates monistic thinking so that for a human being to become eminent, only one path can be followed. For example, Antonio Vallejo-Nájera argued that for a man or woman to become someone of good, he or she must be the product of sexual reproduction between a man and a woman in a sacramental Christian marriage. However, within the advocates of liberal eugenics, we see that the most predominant view of success is a pluralistic view. In other words, for philosophers such as Nicholas Agar or Allen Buchanan, there is no ideal genetic scheme to be achieved, nor an ideal environment to be imitated, so various human beings can achieve success from very different genetic backgrounds and within very different environments. Even within his pluralistic schemes, we can find variations if we compare the different authors mentioned above, Buchanan being more inclined to particularism than Agar, as the former considers that each type of genetics could require a specific environment, which could lead to the fact that in the future, due to genetic differences, the interests of one individual may clash with those of another, as there are not enough environments to cover all types of genetics.

In the next chapter, we will discuss applicable breeding technologies for the genetic modification of human beings. We will look at what they are, what they do, and what experiments have been carried out.

3. THE ENHANCEMENT TECHNOLOGIES

In the previous chapter, we discussed the meaning of the concept of liberal eugenics, where parents are free to choose the traits of their offspring. This new form of eugenics is a non-coercive eugenics. At the end of the chapter, we concluded that it had three key characteristics: the first is the defense of individualistic thinking and a state of neutrality; the second is the defense of the interactionist conception by considering both genes and environment as equally important for the development of the individual; and the third is the defense of pluralistic thinking by considering that there are several ways for a person to become eminent. In this chapter we will focus on the technological methods that can be used in order to realize the goals of liberal eugenics, this is, the enhancement technologies.

3.1. What are enhancement technologies?

Within the field of liberal eugenics, we can define the enhancement technologies as the future, or in some cases present, technologies that function as a means to have modified and improved offspring with the traits selected by the parents.

Over the last decades, many films, series, and video games have presented their own vision of these technologies, such as Star Wars, Blade Runner, Gattaca, or Prototype. However, the way in which these entertainment media have presented them is too simple and flawed.

As Nicholas Agar points out, to talk about the enhancement technologies is to talk about very complex processes, and perhaps we as philosophers may not be able to appreciate all this complexity as much as someone involved in genetic engineering. However, we know that, within the study of the enhancement technologies, there are moral and ethical issues. Therefore, the solutions to these problems cannot be left to those who do science alone, for science, although it is a very useful tool today, lacks moral and ethical guidance in itself. For this reason, bioethics committees have emerged and are of great relevance. Their function is to analyze and evaluate clinical research projects such as medicines and medical devices from an ethical, technical, scientific, and legal point of view[136].

At the same time, Agar points out, bioengineers fail to see the full extent of the problem. Ethics in the enhancement technologies must be linked to scientific knowledge and moral wisdom. Scientific knowledge looks at the details, while moral wisdom must have a broad focus. We must also beware of the effects of these new technologies, not only on individual human organisms but also on communities of people[137]. With this claim, Agar is referring to

[136] See the links section of the website of the *Fundación Canaria Instituto de Investigación Sanitaria de Canarias* (FIISC) https://fciisc.fundanetsuite.com/ConvocatoriasPropias/es/Convocatorias/DesgloseEstadoTipoConvocatoria/OFER

[137] Agar, Nicholas (2004) *Liberal Eugenics. In defense of Human enhancement*. United States, Blackwell Publishing. p: 22.

entities such as CLONAID, a company founded in 1997 by the Raelians, a religious movement originating in France. We will focus on it later.

Therefore, when dealing with enhancement technologies, we must show the public moral descriptions in a transparent way, arising from scientific knowledge and moral evaluations. Transparent descriptions will enable people who are affected by such technologies to better understand what results will be achieved and how they will be realized.

Having clarified the concept of enhancement technologies and their objectives, this chapter will look at four examples of them: cloning, genomics, CRISPR technologies, and artificial wombs.

3.2. Cloning

The concept of cloning can be defined as a form of asexual reproduction in which the clone is a genetic copy of the original being. This form of reproduction can also be called monogenesis, as it is a form of reproduction in which there is only one biological parent. In nature, some plants and unicellular organisms such as some bacteria are able to reproduce by means of natural cloning[138]. However, in this thesis we will focus mainly on artificial cloning focused on humans.

Normally, when the term "cloning" is mentioned, it is usually associated with what one consumes in Hollywood movies, such as the Star Wars saga, in which clones are represented in the form of Stormtroopers, this si, soldiers in white armor who are exact replicas of Jango Fett's character, commanded by Palpatine's galactic empire. However, this fictional version of the clones is far from reality. The truth is that, although the clone resulting from cloning will always have the same sex as its original counterpart because all of its genetic inheritance comes from a single being, this does not mean that the clone will be identical to it.

In other words, the clone, despite being genetically identical to its original counterpart, can live and develop in a very different environment, which can cause great differences between the two, both physically and psychologically. Physically because the environments in which the two are can be very different, whether in access to nutrients, temperature, humidity, etc. Psychologically because the environments, personal experiences, and people surrounding the one and the other can cause great differences between the original and the clone in the way they think and conceive the world. As Fletcher points out, unique genotypes in unique environments produce unique individuals. Therefore, even cloning can create a unique individual when it interacts with its own history because although it does not have a unique genotype, it can form a unique individuality as it interacts with its own history[139].

[138] Sarkar, Bijay (2022) "Human Cloning and its Ethical Queries" *Journal of Positive School of Psychology,* Vol. 6, pp: 8-17
[139] Fletcher, Joseph (1974) *The Ethics of Genetic Control. Ending reproductive roulette.* United States, Prometheus Books. p: 74

Another interesting fact about cloning is that the resulting clone will be a fully fertile being if its original counterpart was also fertile. Therefore, it will be able to have offspring, either through a natural sexual process or artificially[140].

On the other hand, cloning could even be carried out on a living being after death. To achieve this process, it is necessary that the living being, immediately after death, is placed in a chamber at an average temperature of 4°C, such as a refrigerator. The aim should be to extract cells from the dead animal as soon as possible, as cloning will become more difficult with each passing day. It is estimated that the maximum time that should elapse from the death of the living animal until biopsy samples are submitted to a laboratory is about five days[141].

One of the current expert companies in the cloning of living beings is the American company Viagen Pets. This company offers its customers the possibility of cloning their pets, be they dogs, cats, or even horses. The reasons why customers may turn to this company are diverse, from missing a pet to multiplying the lineage of exceptional horses.

One of his latest achievements, dated 2020, is the cloning of a Przewalski horse, an endangered species of Mongolian wild horse. Kurt, the name of the cloned horse, is the result of a cloning made from the frozen cells of an original Przewalski in 1980. Kurt's original reference died in 1998. Although the frozen cells date back forty years, Kurt was born in 2020, the first clone of this species. This is, according to the San Diego Zoo, where Kurt lives, a milestone in attempts to preserve this endangered animal species[142].

As we can see, this enhancement technology can be used for various purposes, from the improvement of a species, such as even the human species, to preventing the extinction of a group of animals.

3.2.1. Distinctions in cloning

Within cloning, there are two ways in which cloning can be carried out, depending on the objective to be achieved. The first is reproductive cloning, and the second is therapeutic cloning[143].

[140] Fletcher, Joseph (1974) *The Ethics of Genetic Control.* p: 72
[141] In Viagen Pets' company emergency protocol, they add that the animal should not be frozen. In addition, for the biopsy, they recommend skin and ear tissue samples (at least one ear sample for deceased pets). Three to four independent samples of more than one type of tissue are recommended https://viagenpets.com/emergency-pets/
[142] (2020) "Clonan con éxito un ejemplar de caballo przewalski" [online] *Yukatan Journal* https://www.yucatan.com.mx/imagen/clonan-con-exito-un-ejemplar-de-caballo-przewalski [accessed 8 November 2020].
[143] It can be argued that there is a third form of cloning called "gene cloning". This form of cloning, also known as *DNA cloning*. In this form of cloning, copies of genes or DNA segments are produced in order to study their properties. However, this form of cloning has a very different methodology to therapeutic and reproductive cloning. For more information, see: Sarkar, Bijay (2022) "Cloning and Its Ethical Queries".

3.2.2. Reproductive cloning

Reproductive cloning is a form of cloning in which the aim is to give rise to an entire living being. In other words, in this form of cloning, the aim is to clone an entire person or animal.

One of the ways to carry out a complete cloning of a living being is the method known as *Somatic Cell Nuclear Transfer*. This is the method by which the aforementioned company Viagen Pets clones animals. Similarly, this was the method used to produce Dolly the sheep, the first clone from an adult cell, born in 1996, to whom we will devote a section later on.

For this process, three female sheep were needed. From the first sheep, a somatic cell was removed from the mammary gland. The nucleus was removed from this cell. Then, an unfertilized egg was removed from the second sheep. The nucleus of this egg cell was also removed. Then, the nucleus of the somatic cell was inserted into the unfertilized egg. This caused the genes in the nucleus of that adult somatic cell to rejuvenate, giving rise to new life. Finally, that nucleus-free egg, fused with the nucleus of that somatic cell, was introduced into the uterus of a third sheep, who would eventually give birth to Dolly[144].

3.2.3. Therapeutic cloning

Therapeutic cloning is a form of cloning in which the main objective, unlike reproductive cloning, is not to produce a new being but to create tissues or organs so that they can be transplanted into people in need.

For this form of cloning, a somatic cell transfer would be carried out, as in reproductive cloning, with the difference that, instead of letting the future being develop and be born, a stem cell would be extracted from the cloned embryo, the cloned embryo would be discarded, and then this stem cell would be placed in a Petri dish and would develop into an organ or tissue that would have the same genetics as the original being, this is, the patient to be treated.

According to Henning Rosenau, professor at Martin Luther University Halle-Wittenberg, researchers studying therapeutic cloning are interested in embryonic stem cells, because these cells can be extracted four days after fertilization of the blastocyst, meaning that these cells would no longer be totipotent cells, this is, cells that have the ability to divide into different cells that can give rise to a whole organism. This means that they would no longer be able to develop into a complete human organism, but they have the ability to develop as every cell type of the three germ layers: ectoderm, which is the outer layer; mesoderm, which is the middle layer; endoderm, which is the top layer[145]. This means that these cells are capable of developing into 210 cell types in the human body because although these cells are not

[144] Garmon, Jay (2011) "Geek Trivia: How many parents did Dolly the cloned sheep actually have?" [online] *Techrepublic* https://www.techrepublic.com/blog/geekend/geek-trivia-how-many-parents-did-dolly-the-cloned-sheep-actually-have/2/#:~:text=Dolly%20was%20%22built%22%20from%20three,was%20a%20Finn%2DDorset%20sheep. [accessed 9 November 2020.]

[145] The germ layers are a group of cells formed during embryonic development, from which the tissues and organs of living organisms are formed.

totipotent cells, they are pluripotent cells, this is, cells that have the capacity to divide into different cells that can give rise to tissues or organs, but not to a complete organism. Thanks to this, says Rosenau, it could be possible to grow neurons to treat diseases such as Alzheimer's or Parkinson's, or even to create whole organs for transplantation[146].

3.2.4. The Raelians and the desire for immortality

Among the defenders of cloning, especially reproductive cloning, we find the Raelians, a sect founded in France in 1974 by the journalist Claude Maurice Marcel Vorilhon, better known as Rael. This sect claims that human beings are the creation of extraterrestrial beings called Elohim by means of cloning. Similarly, the Raelians believe that the secret of immortality lies in cloning because once we make exact replicas of ourselves, we can transfer our memory and personality to the brains of clones, thus being able to live forever at the cost of constantly changing bodies.

In 1997, a group of Raelians founded CLONAID, a company supposedly dedicated to human cloning, located in the Bahamas. This organization claimed in 2003 to have successfully cloned three human beings but refused to confirm this, refusing genetic tests to prove the veracity of such cloning.

Agar completely disproves the Raelian religion and the CLONAID company, believing that their goals face obstacles that are metaphysical rather than technological. He comments that even if technological methods, such as the *Somatic Cell Nuclear Transfer* mentioned above, are perfected to such an extent that a life is created with 100% efficiency, no philosophically coherent view of personal identity allows us to think of that clone as the original person. In other words, a clone is another individual distinct from the original, despite being genetically identical to it. We are not, therefore, talking about a human-shaped vessel into which the memory and thoughts of others can be transferred. Personal identity is not something we can store on a hard disk drive and transfer from one thing to another.

Agar comments that philosophers have followed three general strategies to explain personal identity and how it survives over time.

1) Identity survives second by second because of something non-material, this is, the soul.
2) Identity survives for the body, at least as long as certain organs continue to function.
3) Identity survives because of its psychological behaviors and attitudes: memory, beliefs, and hope.

As for the first strategy, Agar comments that we would hardly ever be able to transfer the soul of an original being to a clone if such a thing as a soul exists. If *Somatic Cell Nuclear Transfer* could transfer the soul from one body to another, then we would have to say that our soul is attached to each of our cells, down to the DNA level. This would make creating

[146] Soniewicka, Marta, et al. (2018) *The Ethics of Reproductive Genetics.* Springer, Poland, Ed. Soniewicka, Marta. pp: 137-138.

clones useless, because the soul would be so dissolved in all our cells, leading to inevitable imperfections in cloning.

As for the second strategy, it is true that in cloning there is some physical relationship between the original being and the clone. However, there is no physical theory that assures us that we will survive forever from our original body to the body of a clone of us.

Finally, as for the third strategy, when cloning is carried out, genetic material is transferred. Neither behaviors, psychological attitudes, or memories of the original being are transferred to the clone[147]. Therefore, we can conclude that the Raelian idea of achieving eternal life through cloning is not a plausible idea.

3.2.5. Improving life expectancy with cloning

In the previous chapter, we noted that one of the most desired improvements in genetic engineering, and thus also in the enhancement technologies, is the improvement of human intelligence. However, intelligence is not the only trait that genetic engineering and the enhancement technologies have focused on. Another trait to highlight would be the improvement in life expectancy.

John Burdon Sanderson Haldane, who was mentioned before, was a promoter of transhumanist thought. This thought, as we have already seen, advocates the technological enhancement of human beings so that the species transcends its own limits and evolves into what transhumanists call "posthuman".

Haldane argued that cloning could be used to produce not only more intelligent generations, but also to prolong the life span of human beings. According to him, the most talented human beings had to be selected for cloning to produce more talented generations. In the case of athletes, they were to be cloned in their youth, but in the case of great scientists and mathematicians, it was preferable to wait until they were about fifty years old to be cloned. This was, according to Haldane, to ensure that the genomes of these beings would guarantee replication. Similarly, for the extension of human life, he argued that it was necessary to clone centenarian humans who were in good health.

However, Agar criticizes Haldane's position again, arguing that, as with people in their fifties, the same problem occurs when cloning centenarians in order to create new beings with a long life expectancy. In other words, the new cloned beings, while having the genetics to live for many years, would already have the physical capabilities of a centenarian from the beginning of their lives, so the life expectancy advantage is overshadowed by the effect of the mobility of an old person.

This is because the DNA of our somatic cells undergoes mutations during our lifetime. Therefore, the DNA of somatic cells would have to be edited to prevent clones from emerging with reduced mobility. However, the natural division of our body's cells, and DNA

[147] Agar, Nicholas (2004) *Liberal Eugenics. In defense of Human Enhancement.* p: 36

replication, will make this project impossible. Every time cells divide, DNA must be copied. Moreover, the human genome is very large, consisting of more than three billion pairs of DNA. Therefore, the plan to clone an old man in order to have new beings that live longer and longer is an immense task and not at all feasible[148].

Because of the complication of improving human life expectancy through cloning, Agar says that perhaps one solution is to freeze somatic cells from all individuals, and once we know which individuals have the best life expectancy, proceed to clone those frozen somatic cells. However, besides the fact that it would be an exhausting task to have to freeze the cells of a country's entire citizenry, as Agar points out, in this task we must try not to fall into the error of genetic determinism, this is, thinking that we are simply what our genes say we are. A clone will have the same genetics as its original self, but differences in the environment may cause differences between the two. We must take into account that, after the freezing of somatic cells, the clone will live in a different era than the original being and will therefore have a different environment, which could make it difficult in some respects for it to live as long as the original being.

3.2.6. The story of Dolly the sheep

One of the most important examples of cloning, as we have pointed out, was Dolly the sheep. It is therefore one of the most important milestones in the field of modern biomedicine.

Dolly was born in 1996 in Scotland, in a village in Edinburgh called Roslin. There she grew up and lived at the Roslin Institute, one of the world's leading animal research and biotechnology centers. Dolly spent her entire life there until 2003 when she died of an incurable lung disease called Jaagsiekte[149]. Although this is the official explanation for her death, some suspect that she may have died because she was a clone. This is because the average life expectancy of a sheep is between ten and twelve years. However, Dolly died prematurely at the age of seven. Nevertheless, other sheep from Dolly's flock also died of the same lung disease, implying that cloning as a cause of Dolly's death seems to be disproven at present[150]. After her death, her body was donated to the National Museum of Scotland, where it is now on display.

With the aim of analyzing Dolly the sheep and the importance it had for the history of science, Miguel García Sancho, a researcher at the University of Edinburgh, reconstructs the history of Dolly's research and the reasons of certain British researchers for its creation.

The origins of this sheep date back to the 1980s. At that time, the UK government became interested in recombinant DNA techniques, because these techniques were seen as a model for industrial intervention in scientific application. Therefore, some scientists from the

[148] Agar, Nicholas (2004) *Liberal Eugenics*. p: 26
[149] It is a contagious bovine disease, which can cause lung cancer. The bovines suffering from the disease have breathing difficulties and exhale a milky white fluid from their nostrils.
[150] Fernández, Vicente (2017) "La oveja Dolly no murió de forma prematura por culpa de la clonación" [online] *Quo* https://www.quo.es/ciencia/a69428/oveja-dolly/ [accessed 24 November 2020].

Animal Breeding Research Organisation (ABRO), an association founded in 1945, thought of using these DNA recombination techniques for livestock experiments.

At the beginning of the decade, ABRO focused on the creation of transgenic mice. The aim of these experiments was to create some kind of marketable product. Two things were pretended: on the one hand, to create a system for introducing desired genes into mammalian cells and, on the other hand, to introduce this system into the genomes of laboratory and farm animals[151].

As time went by, the focus shifted from experimenting with mice to experimenting with sheep. This led to the creation of the *Biopharming* project, a scientific project that consisted of the production of transgenic sheep that secreted proteins in their milk for therapeutic use in humans[152]. The main researchers behind this project were the British embryologist Ian Wilmut, the British molecular biologist Richard Lathe, and the British molecular biologist John Clark, who was a postdoctoral researcher at the time.

ABRO's goal with this project was that the new transgenic sheep, with their milk, would secrete a substance that could improve the health of humans, rather than improve the health of the animals. Thus, Wilmut, Lathe, and Clark initially thought of making the milk of the transgenic sheep contain proteins to treat diseases such as hemophilia or lung disease. In 1986 ABRO eventually was fused with PRC (*Poultry Research Centre*), which was an Edinburgh-based livestock breeding center founded in 1947. At the same time, ABRO and PRC were fused with the *Institute of Animal Physiology,* an animal research institute located in Babraham, a village in Cambridgeshire, England. The fusion of these three research centers resulted in the *Institute of Animal Physiology and Genetics Research* (IAPGR). This new center was split into two research centers, one in Edinburgh and the other in Babraham. This triple fusion was created in order to improve the technological and financial resources to carry out this research on sheep. One year later, in 1987, a biotechnology company was created at Roslin to exploit the proteins produced. Initially, this company was called *Caledonian Transgenics*, but over time its name was changed to *Pharmaceutical Proteins Limited* (PPL).

In the end, the Biopharming project transformed the sheep's identity from an animal to an object of research in reproductive science. One of the first results produced, with the collaboration of Wilmut and other molecular biologists, was Tracy, a transgenic sheep born in 1990. Its main characteristic was that it possessed in its mammary glands a gene that was implemented for the ATT protein, used for the treatment of emphysema[153], and cystic fibrosis[154]. However, Tracy was unable to generate this protein when it reached adulthood.

[151] Garcia, Miguel (2015) "Animal breeding in the age of biotechnology: the investigative pathway behind the cloning of Dolly the sheep" [online] *Springer* https://link.springer.com/article/10.1007/s40656-015-0078-6 [accessed 24 November 2020].
[152] Ibid.
[153] Emphysema is a lung problem. It is a build-up of air in the sacs of the lungs (alveoli) making it difficult for a person to breathe.
[154] Cystic fibrosis is a disease that causes a build-up of thick mucus in the lungs, gastrointestinal tract, and other parts of the body, producin blockages and even death.

The reason for this was thought to be that this gene was introduced into Tracy when it had already passed its embryonic stage. So Wilmut's research team began to think about the idea of introducing genes before the embryonic stage. And so the idea of cloning began to be considered.

With this idea in mind, two clonings were carried out in 1995: two sheep, Megan and Morag. These sheep were the product of cell nuclei from embryos. However, the aim of cloning was not to clone an embryo but to clone an adult animal. Thus, a year later, in 1996, Dolly, the first animal cloned from the cells of an adult animal, was born.

The following year, in 1997, Dolly was introduced to the world, and Wilmut became the visible face behind the project. However, the media misinterpreted Dolly's story, portraying her as an end in herself, rather than as a means to a product that would benefit humans. With the advent of cloning, the Institute considered that cloning, in addition to animals, could be used in other fields, such as xenotransplantation. This practice refers to the transplantation of cells, tissues, or organs from one species to another, for example from pigs to humans.

In conclusion, while the reasons for creating Dolly are known in the context of genetics, they are less well known to the general public. These reasons involved a biotechnological research project that was never completed, something that has happened throughout the history of Dolly, and other experiments carried out in Edinburgh. Moreover, the fact that the experiments were never completed may explain why many of these stories have not become popular. Today, Dolly is considered a success story in the world of cloning. However, there is still a long way to go before cloning, such as therapeutic cloning, can be practiced in clinics with human beings.

3.3. Genomics

The second enhancement technology we will look at in this chapter is genomics, which is the science of studying genomes. Within this science, the technique that could be used as an enhancement technology is the *Preimplantation Genetic Diagnosis* technique, known by its acronym PGD. This assisted reproduction technique consists of the in vitro fertilization of several eggs from one woman. From the resulting embryos, one or two cells are extracted from each embryo and examined for desired traits. In this way, the parents could choose offspring with desirable traits, selecting those embryos with such traits and discarding those that do not have them or are in a poor state of development[155]. The main objective of genomics is to gain an in-depth understanding of the genes that make up human beings and to see how they affect us. This would be a great help to genetic engineers and genetic diagnosticians to better focus on their goals, which include finding out which genes are most related to our intelligence.

Genomics is the science with which Agar himself imagines his utopian world. In this ideal scenario, it has identified all human genes and told us about their functions and how they are

[155] Agar, Nicholas (2004) *Liberal Eugenics*. p: 10

carried out. Genetic engineers are able to transfer genes from one genome to another with their properties intact. Pregnancies carried out with the new technologies have the same range of risk as natural pregnancies. Likewise, a person with high intelligence, who has been genetically modified, has the same number of chances of suffering from a disease as an ordinary human being[156].

3.3.1. The Doogie Mice

One of the most important experiments in the field of genomics was a group of mice called Doogie. These mice were characterized by an extra NR2B gene. Thanks to this, they were able to learn faster than normal mice, and memorize the learned content for a longer period of time, four to five times longer than a normal mouse. These mice were unveiled in 1999 by the research team of Chinese neuroscientist Joe Tsien. In that year, the results of this experiment were published in the article "Genetic enhancement of learning and memory in mice".

Joe Tsien and his team of researchers, with their experiment on mice, wanted to test the efficacy of the Hebb theory, described by the Canadian biopsychologist Doland Hebb in 1949. This theory holds that learning and memory are based on changes in synaptic strength[157] between simultaneously active neurons. This implies that improved synaptic coincidence detection would allow for more efficient memory and learning[158]. Therefore, if the NMDA (N-methyl-D-aspartate) receptor, which is a synaptic coincidence detector, acts as a classified memory switch, then enhanced signal detection by NMDA receptors should improve memory and learning. What Joe Tsien and his research team aimed to show is that overexpression of a receptor called NMDA 2B (that would be the NR2B gene) found in the front of mouse brains results in enhanced activation of NMDA receptors, facilitating synaptic potentiation in response to stimulation at 10-100 Hertz. As a result, Doogie mice would have more advanced memory and learning ability compared to normal mice.

The NR2B gene involves something that determines the deterioration of NMDA receptor. To put it another way: when we look at something, such as an object in the outside world, information enters our brain, and we retain it. When we stop observing that object, as time goes by, then our memory of that object will become more and more blurred, and more and more distant from reality, because we will gradually forget it. This memory deterioration is due to a deterioration in the NMDA receptor, which is determined by the NR2B gene. However, if a mouse has an extra NR2B gene, then it will be able to retain outside information in its memory for a longer period of time.

[156] Agar, Nicholas (2004) *Liberal Eugenics.* p: 38
[157] The synapse is the space between one neuron and another, so synaptic strength refers to the transmission of information between neurons on either side of the synapse.
[158] Tsien, Joe, et al (1999) "Genetic enhancement of learning and memory in mice" *Macmillan Magazine,* Vol. 40: 63-69.

To test the memory and learning ability of Doogie mice and normal mice, Joe Tsien's research team used novel object recognition tests. To increase the difficulty of these tests, a five-minute training protocol was used. During this training, the mice explored two objects. At this point, both normal and modified mice show the same curiosity and motivation to explore them. Then, during these tests, one of the two objects is changed and replaced by a third object. As before, the animals are allowed to explore it for five minutes. One hour after the exploration test of the new object, without being able to see it again, both normal and modified mice, after seeing the objects again, show similar preferences for the new object, so there is no difference at this point. However, if the test of retaining the new object in memory, after five minutes of analysis, is prolonged for one or two or three days, the modified mice show a greater preference for the new object than the normal mice. This proves that the modified mice have a better memory.

The researchers examined how the mice memorized the objects. They associated two ways in which the mice memorize: the first is the contextual fear condition, and the second is the cued fear condition.

The contextual fear condition occurs when an animal is placed in a new environment where it is given an aversive stimulus, such as an electric shock to the feet, and then removed from that environment. When the animal is placed in the same environment again, it will usually show a fear response and freeze, if it remembers and associates the environment with the shock it received in the past. *Freezing* is a fear response, which is defined as the absence of movement except for breathing. This state can last seconds or minutes depending on the strength of the stimulus, the number of presentations to the environment, and the degree of learning acquired by the animal.

On the other hand, the cued fear condition is similar to the contextual fear condition, but with one notable difference: a conditioned stimulus, this is, a sound signal, is added. In order to differentiate the contextual fear condition from the cued fear condition, researchers, when faced with an experiment, such as the Doogie mice experiment, provide the animals with a pre-exposure trial to the context without an unconditioned stimulus, this is, without being given a shock. This allows the animal to take all the information from the context without the shock and without the presence of a sound signal. In a second exposure to the context, the sound signal, this is, the conditioned stimulus, is presented and the animal is given a shock. Thus, the animal is better able to learn the association of the shock with the conditioned stimulus because the context is not as accurate as the conditioned stimulus regarding the shock, since the animal has previously witnessed the context in the absence of the shock[159].

Thus, animals learn to be afraid either because they associate a sound with a shock (cued condition fear), or because they associate an environment with a shock (contextual condition

[159] Curzon Pete, Rustay Nathan, Browman Kaitlin (2009) "Cued and Contextual Fear Conditioning for Rodents" in Buccafusco Jerry et al. *Methods of Behavior Analysis in Neuroscience. Second Edition,* United States, CRC Press, p: 21.

fear). The contextual fear condition depends on the hippocampus, and the cued fear condition does not. Both fears require activations of NMDA receptors[160].

Joe Tsien's team of researchers first examined Doogie mice and normal mice for the contextual condition of fear. The modified mice were found to exhibit greater fear responses. Secondly, the two groups of mice were examined with respect to the cued fear condition. Again, the Doogie mice were found to exhibit an elevated fear response and *freezing*, compared to the normal mice.

After these two experiments, the two groups of mice were tested for fear extinction. If they were exposed to the context or the conditioned stimulus, this is, the sound signal, without the unconditioned stimulus, this is, the shock, then both the context and the stimulus would lose their ability to produce fear in them. Fear extinction was therefore examined, and it was observed that the modified mice, 24 hours after the initial fear response, showed stronger fear responses to both contextual and cued fear tests. However, these same modified mice showed much less *freezing* of fear during subsequent 24-hour exposures to either the context or the auditory key than normal mice. Thus, fear extinction occurred more rapidly in Doogie compared to normal mice, indicating that Doogie mice were faster learners.

In this way, Joe Tsien's team of researchers concludes that NMDA receptors serve as a molecular switch for synaptic plasticity and memory formation, validating Hebb's learning theory. This demonstrates that modifications of synaptic efficacy that are dependent on NMDA represent a mechanism associated with learning and memory. Furthermore, the data provided by these researchers indicate that neuronal activities in the 10-100 Hertz range in the frontal part of the brain may be crucial for the encoding and storage of learned information. Furthermore, the identification of NR2B as a molecular switch in-memory processing is an important point to consider when treating memory and learning disorders. Therefore, the study of Doogie mice also reveals a promising strategy for the creation of modified mammals with enhanced intelligence and memory[161].

As with the Doogie mice, genomics has been used in other experiments such as the Schwarzenegger mouse. This mouse, created by scientists at Harvard University under the direction of researcher Lee Sweeney, has the extra gene IGF-1, related to insulin production, which causes muscle enlargement. Both the NR2B gene and the IGF-1 gene exist in humans. Tsien's team, therefore, speculates that we can use our knowledge of the NR2B gene to correct diseases such as Alzheimer's or Parkinson's disease. Similarly, Sweeney and his team of researchers say that thanks to the IGF-1 gene and genomics we may, in the future, be able to correct muscular dystrophy in the unborn[162]. However, genomics and the experiments carried out thanks to PGD are not free of controversy. We will focus on this later.

[160] Tsien, Joe, et al (1999) "Genetic enhancement of learning and memory in mice".
[161] Ibid.
[162] Agar, Nicholas (2004) *Liberal Eugenics.* p: 11

3.4. CRISPR technologies

Both cloning and genomics are enhancement technologies that have been present in the field of bioethical research since the 20th century. However, in the last century, other enhancement technologies have been added to the list. One of these is CRISPR technologies. These, whose full name is *Clustered Regularly Interspaced Short Palindromic Repeats,* designate repetitive sequences in the DNA of bacteria that function as self-vaccines. If the bacteria in our bodies are attacked by viruses, the genetic material of these viruses will be recorded in this sequence in the bacteria, this is, in CRISPR. If a virus that has attacked our bacteria in the past suddenly attacks again, then it can be recognized thanks to the information stored by the bacteria in CRISPR and, thanks to this, defend itself against the new invasion by cutting the DNA of the invaders[163].

Over time, scientists have learned to use the CRISPR tool outside bacteria to cut and paste pieces of DNA at will. As a result, today's scientific community often refers to CRISPR as "molecular scissors".

3.4.1. The functions and applications of the CRISPR tool

CRISPR and its function were first predicted in 2005 by Spanish microbiologist Francisco Mojica. Later, in 2012 and 2013, several teams of researchers led by US biochemist Jennifer Doudna, the French microbiologist Emmanuelle Charpentier, and the neuroscientist Fen Zhang unraveled its mechanism and harnessed it to design a simple yet powerful tool for DNA editing in any type of cell.

For its function, the CRISPR tool uses a guide RNA to recognize the part of the bacterium's DNA to be edited. At the same time, CRISPR also uses a protein[164] called (Cas9) to, together with the guide RNA, cut the selected part of the bacterium's DNA. At this point, CRISPR has two options. The first is to remove a part of the DNA that is of no interest and join the two ends of the cut DNA together to knock out a malicious gene. The second option is to introduce, after removing the unwanted DNA part, another modified DNA sequence. This second option would mean editing the DNA at will.

Lluis Montoliu, a researcher at the CSIC National Biotechnology Centre and one of the leading experts on CRISPR in Spain, says that CRISPR is one of the most robust technologies ever described in biology, and moreover, it is a simple and cheap technology, and no special equipment is needed to apply it. Previous gene editing techniques were much more laborious, unpredictable, and expensive[165].

[163] Méndez, Jesús (2017) "El editor genético CRISPR explicado para principiantes". [online] *Agencia SINC* https://www.agenciasinc.es/Reportajes/El-editor-genetico-CRISPR-explicado-para-principiantes [accessed 22 December 2020].
[164] The name of the Cas proteins, which accompany CRISPR, is a derivative of (CRISPR associated protein).
[165] Méndez, Jesús (2017) "El editor genético CRISPR explicado para principiantes".

In addition, CRISPR technologies can be applied to almost any field where you want to modify the DNA of something. These fields can be the food industry, to create transgenic foods with the desired characteristics, which can lead to conflict because instead of introducing genes into the plant, existing genes are modified; animal research, to correct diseases in animals and prevent mammals such as chimpanzees from being born with a genetic defect, as well as to modify mosquitoes to prevent malaria, which would break with natural selection; and human medicine, to correct defective genes linked to diseases, as well as gene editing in fetuses[166].

In genetic projects carried out with CRISPR, a gene can even be modified and inherited with a 100% probability. This could change everyone in a city within a few generations. However, the most anticipated application of CRISPR is as a gene therapy. Initially, this tool is intended to treat diseases that are caused by a single gene and are located in areas not very deep in the body, such as diseases in the eyes, muscles, or blood. CRISPR is intended to provide a satisfactory solution to diseases such as muscular dystrophy, anemia, or forms of blindness such as congenital amaurosis[167].

This technology, however, is still very new, so its risks are still high. Nevertheless, in 2020, it has been applied as an alternative to PCR (Polymerase Chain Reaction) for the detection of COVID-19. And although the advances in the CRISPR tool seem promising, Montoliu argues that this technology should not be used in haste. Initially, Montoliu says, the first to benefit from these technologies would be adults.

3.4.2. The COVID-19 pandemic and CRISPR technologies

In March 2020, the entire planet was hit by a virus called Coronavirus, also known as COVID-19, which was originated in the city of Wuhan, China. This virus generated a major socio-economic impact worldwide, causing one of the largest recessions in history. Diagnostics for COVID-19 have been carried out mainly with PCR tests[168], which are performed in centralized laboratories. These are tests used to detect the genetic material of diseases, such as HIV. In particular, we are referring to RNA. These tests can be used to screen donated blood for infection early, before antibodies have developed, and can be performed days or even weeks after exposure to the disease.

[166] Antonio Peñas, José (2015) "Así funciona CRISPR, la revolucionaria herramienta de edición de ADN". [online] *Agencia SINC* https://www.agenciasinc.es/Visual/Infografias/Asi-funciona-CRISPR-la-revolucionaria-herramienta-de-edicion-de-ADN [accessed 28 Dec. 2020].

[167] Leber's congenital amaurosis (LCA) is a genetic eye disease, centered on the retina. People affected by this disease are usually blind from birth or in the first years of life. This is due to two factors: firstly, an absence of the cones, which are the retinal photoreceptors located in the inner layer of the eye, preventing daytime and color vision. Secondly, an absence of the rods, which are the photoreceptors of the retina located in the innermost layer of the eye, preventing night vision or in places with low illumination.

[168] See: Stanford Health Care https://stanfordhealthcare.org/medical-conditions/sexual-and-reproductive-health/hiv-aids/diagnosis/pcr.html

However, in addition to PCR, alternatives have also been sought for the fight against the pandemic. The companies "Sherlock Biosciences" and "Mammoth Biosciences", during the year 2020, fought to generate improved diagnostics with CRISPR technologies in order to increase and accelerate the detention of COVID-19, and therefore provide better treatment for patients and control the spread of the virus.

Before the pandemic, Sherlock CEO Rahul Dhanda expected CRISPR-based diagnostics to be available in 2023. However, because of the outbreak, we may see the application earlier than expected[169].

The case of Sherlock Biosciences

The first company, Sherlock Biosciences, founded in 2018 and led by the Chinese neuroscientist Feng Zang, developed a program that can be used to diagnose COVID-19 using the CRISPR tool. This is the *Specific High Sensitivity Enzymatic Reporter unLOCKing* program in which the CRISPR tool is used in conjunction with a Cas9 variant protein, Cas13a. Unlike Cas9, Cas13a does not cut DNA, but rather cuts RNA, and has the ability to be activated by a specific small RNA guide that is complementary to the RNA to be cut and degraded[170].

Supposedly, Feng Zang's team of researchers discovered that when Cas13a is applied and starts cutting RNA, it ends up cutting and degrading not only the complementary RNA but any RNA in the immediate vicinity. Given this scenario, the CRISPR-Cas13a project looked like a disaster. However, Feng Zang ended up turning what seemed like a scientific experiment with a negative outcome into a way to locate DNA and RNA molecules present in minute quantities in a sample[171].

Zhang and his researchers had the idea of adding small RNA molecules that have a fluorescent molecule at one end and a fluorescence inhibitor molecule at the other end. When the fluorescent molecule and the fluorescence inhibitor molecule come together, no fluorescence is emitted. But when Cas13a starts cutting RNA, it cuts all the RNAs present there, and that includes RNA molecules that have fluorescent molecules and fluorescence-inhibiting molecules. When the fluorescent molecules and fluorescence-inhibiting molecules separate, they will begin to glow, and it is possible to detect this glow of light using specific light detectors. As the glow does not appear until RNA degradation occurs, and as degradation does not start unless RNA complementary to the guide RNA is present, this indicates that the SHERLOCK method is a very specific method for detecting DNA (which

[169] Martz, Lauren (2020) "CRISPR-based diagnostics are poised to make an early debut amid COVID-19 outbreak" [online] *Biocentury* https://www.biocentury.com/article/304556/crispr-based-diagnostics-are-poised-to-make-an-early-debut-amid-covid-19-outbreak [accessed 8 January 2021].
[170] Montoliu, Lluis (2020) "CRISPR y CORONAVIRUS". [online] *Naukas* https://montoliu.naukas.com/2020/04/03/crispr-y-coronavirus/ [accessed 7 January 2021].
[171] Ibid.

has to be converted to RNA by in vitro transcription) or RNA (which does not need this process).

Thanks to the discovery of SHERLOCK, and after the COVID-19 RNA sequence was known in 2020, Feng Zhang released a protocol for detecting Coronavirus via CRISPR-Cas13a, which can be completed in one hour. The SHERLOCK method can detect up to 10-100 molecules of the Coronavirus genome per microliter.

The case of Mammoth Biosciences

Mammoth Biosciences is a biotechnology company founded in 2017 and led by American biochemist Jennifer Doudna. The company has developed a method for detecting COVID-19 called DETECTR (DNA Endonuclease Targeted CRISPR Trans Reporter). Like SHERLOCK, DETECTR uses CRISPR to detect the virus. However, unlike SHERLOCK, DETECTR does not use the Cas13a protein but the Cas12a protein.

The Cas12a protein, which initially cuts double-helical DNA guided by a guide RNA, once it has located the desired gene, "gets mad" like the Cas13a protein with the RNA, cutting any DNA in the sample. Doudna's team, therefore, came up with a similar solution to Zang's team, which was to include single-chain DNA particles in the sample to be analyzed, united with fluorescent molecules that would begin to glow once the Cas12a protein cuts them. The presence of the luminescent glow confirms that the Cas12a protein first cut the problematic gene (or detected its presence)[172]. Thus, the glow is a tip-off to the initial event, and the non-specific activity of the Cas12a protein becomes a sensitive diagnostic, called DETECTR.

The CRISPR tool is thus a multi-purpose tool, capable not only of editing genes or deleting malicious genes but also of detecting them, which is astonishing.

3.5. Artificial wombs

In addition to CRISPR technologies, another enhancement technology that we can find in recent years are artificial wombs. We can define an artificial womb as an artificial medium or environment in which a product is gestated, thus replacing a natural womb. These wombs represent an alternative to the traditional form of gestation and give rise to new options to gestate a future offspring in a safer way, avoiding that the offspring, or even the pregnant person itself, may present some kind of problems in the future. According to Elizabeth Chloe Romanis, PhD in Philosophy, Bioethics, and Medical Jurisprudence at the University of Manchester, once the first versions of artificial wombs are available, we could have an

[172] Montoliu, Lluis (2018) "Las sorprendentes CRISPR y sus aplicaciones en diagnóstico" [online] *Naukas* https://montoliu.naukas.com/2018/02/15/las-sorprendentes-crispr-y-sus-aplicaciones-en-diagnostico/ [accessed 8 January 2021].

alternative to, for example, high-risk pregnancies, which can be dangerous for both the mother and her offspring, and thus be able to avoid fatal endings.

The Mayo Clinic in the United States considers that the factors found in a high-risk pregnancy include: the mother's age of over 35 years, bad lifestyle habits (such as alcohol and drug addiction by the mother, which can endanger not only the mother's life, but also the fetus's life), health problems of the mother (such as diabetes, obesity or epilepsy, among others), complications during pregnancy (inadequate position of the placenta, conditions caused by different blood groups between the mother and the fetus, among others); multiple pregnancies due to twins, triplets or more, or health problems in previous pregnancies (hypertension, premature birth in the previous pregnancy, among others)[173].

Therefore, artificial wombs may, in the future, not only be an enhancement technology that could prevent the new offspring from miscarriage or, once born, from suffering from handicaps such as disease or disability, but could also be an alternative for mothers that can improve their future health prospects, and a new, safer way of carrying a pregnancy. Moreover, artificial wombs could even be a future alternative to surrogacy.

3.5.1. Partial gestations. An alternative to incubators

As of the date of this work, the creation of an artificial womb capable of gestation from start to finish of a nasciturus mammal has not yet been achieved. However, since 2017, experiments have already been carried out with artificial wombs that can gestate mammals born prematurely, enabling them to fully develop.

In humans, prematurity, born at less than 37 weeks gestation, is one of the leading causes of death at birth. However, the prospects of survival after such a birth have increased in recent decades thanks to neonatal intensive care, such as the use of incubators. At present, a baby born at only 28 weeks, or even less, has a chance of survival. However, survival is still something that is not typical, and the fewer weeks of gestation, the more difficult it is to survive. Babies born at 22 to 23 weeks gestation very rarely survive: only 0.7% of them. Before that time, the chances of survival are virtually zero[174]. In addition, 50% of preterm babies at 26 weeks gestation who survive will have severe long-term impairments. If they are only 23 weeks, future deficiencies will be present in 75% of them. Possible deficiencies include underdeveloped lungs, problems with blood circulation, or problems with eating or swallowing. Before 26 weeks, these complications seem inevitable, Romanis points out, although incubators are intended to provide premature babies with oxygen, ventilation, and external pumps to help their blood circulation. However, these processes can sometimes

[173] See the risks of pregnancy on the Mayo Clinic website https://www.mayoclinic.org/es-es/healthy-lifestyle/pregnancy-week-by-week/in-depth/high-risk-pregnancy/art-20047012
[174] Chloe Romanis, Elizabeth (2018) "Artificial womb technology and the frontiers of human reproduction: conceptual differences and potential implications" [online] *Journal of Medical Ethics* https://jme.bmj.com/content/44/11/751 [accessed 10 January 2021].

damage their fragile lungs, or cause their hearts to fail. For these reasons, Romanis points out that incubators are insufficient, so alternatives such as artificial wombs should be considered.

The differences that can be found between an incubator and an artificial womb, in terms of the safety of the preterm infant, born or unborn, are several. According to Jennifer Hendricks, a researcher at the University of Tennessee, an artificial womb can provide more comprehensive medical support for the preterm infant than an incubator can. The care offered by incubator technologies depends on their tolerance to artificial ventilation, which depends on the development of their lungs. This is not a limit for artificial wombs because they are more like a natural gestation[175], this is, they have the capacity to replace a human function. An artificial womb, which can develop a partial gestation, treats the preterm infant as if it had never been born. Incubators, by contrast, are intended only to support the preemie's ability to live, which it is beginning to do.

The preterm infant in an incubator assumes limits to keep itself alive. In contrast, the one in an artificial womb has no such pressures. The artificial womb requires the subject to exercise no capacity for independent living. If such a womb is changed or begins to malfunction, the subject inside would die, like a fetus in a natural womb. In contrast, a premature baby in an incubator could survive shortly after the machine is turned off.

Another important difference between an incubator and an artificial womb is the environment. The intensive care offered by the incubator is very invasive and leaves the preterm baby "exposed" to an environment where human contact is possible. This is not the case in an artificial womb because the preemie is not exposed to human contact, so the health care of a preemie in an artificial womb would not be as intrusive.

3.5.2. The biobag experiment

In 2017, a team of researchers in Philadelphia created what would be the first artificial womb in history, which they called the *Biobag*. This experiment proved to be a success with mammals, allowing the development of four-week-old premature goats. This is equivalent to a 24-week premature human. After the fully developed premature goats emerged from the artificial womb, they grew normally.

As Romanis explains, the biobag is a bag containing something, which has a circuit that pumps oxygen, and access to the umbilical cord through a tube. The system keeps it from the outside, thus minimizing the risk of infection, and amniotic fluid is constantly exchanged, giving it water and nutrients. All of this mimics the normal uterus, causing all subjects placed in the biobag to develop successfully. It is estimated that the biobag would work with premature babies between twenty-three and twenty-five weeks[176].

[175] Chloe Romanis, Elizabeth (2018) "Artificial womb technology and the frontiers of human reproduction: conceptual differences and potential implications"
[176] Ibid.

Once biobags can ensure the survival of preterm infants, in the case of humans, at the threshold of viability possible for artificial wombs, they will be demanded and required by doctors and patients. If artificial wombs, such as the biobag, are successful, subjects will suffer less than incubators, so the use of artificial wombs would increase. In addition, artificial wombs such as the biobag add more opportunities beyond the intensive care of a premature infant. Partial ectogenesis, once available in humans, could become an alternative in obstetrics for managing high-risk pregnancies. When the pregnancy is often life-threatening, abortion is often recommended, the alternative being to continue the pregnancy in the hope of giving birth and survival. However, Romanis argues that artificial wombs could provide a third alternative, which is to cause premature delivery in a high-risk pregnancy and then place the baby in an artificial womb. Thus, an alternative in high-risk pregnancy that does not require the loss of the fetus would be possible[177].

Therefore, an artificial womb, Romanis concludes, rather than helping to rescue a preterm infant, replaces a natural function, and treats the subject as if it had not been born. Artificial wombs could not only give rise to a new form of therapy technologies for new beings, giving them a safer environment for their development in the face of the dangers of a high-risk pregnancy but also an alternative for future parents when deciding how to start a family.

However, if these technologies become viable, it may be that in the future they can be used beyond the limits currently established, leading to artificial wombs that can gestate a future being from conception to the end. However, as of the date of this doctoral thesis, artificial wombs capable of full gestation appear to be a distant technology, which will take years, or perhaps decades, to become available.

3.5.3 Are artificial wombs really an enhancement technology like any other?

When we study this alternative to normal gestation, several questions arise, starting with whether this enhancement technology is really an enhancement technology because in the bio-bag experiment, premature goats were gestated, this is, animals that had already been expelled from the mother's womb. Therefore, instinctively, one would think that in the bio-bag, already-born beings are gestated, and not unborn beings, so we would not be talking about an enhancement technology when we talk about artificial wombs, at least in those cases in which there is only partial ectogenesis. However, what does birth really mean? Is birth the expulsion of something through the mother's womb, or can the expulsion of something through an artificial womb that only fulfills a partial ectogenesis count as birth?

According to Nick Colgrove, a philosophy researcher at Wake Forest University in the United States, subjects in an artificial womb share the same status as a newborn and therefore deserve the same protection as a newborn. For his argument, Colgrove makes two claims.

[177] Chloe Romanis, Elizabeth (2018) "Artificial womb technology and the frontiers of human reproduction: conceptual differences and potential implications"

a) Subjects in partial ectogenesis, this is, developing in a normal uterus and then transferred to an artificial uterus, are already newborns.
b) Subjects in full ectogenesis, this is, fully developed in an artificial womb, share the same moral status as a newborn[178].

Colgrove, for his view of birth, uses the definition given by the World Health Organisation (WHO): the complete expulsion or removal from its mother of a product of conception, irrespective of the duration of birth, at which, after separation, it breathes or shows any other evidence of life, such as a beating heart or voluntary movements, whether or not the umbilical cord is cut[179].

Colgrove comments that to satisfy the first part of the WHO definition, a human must be expelled or removed from its mother. On the other hand, to satisfy the second part of the definition, the being expelled must be breathing or show evidence of life. To determine whether a being has been subjected to birth, Colgrove asks two questions.

1) Has the being been completely expelled/extracted from its mother?
2) After being expelled, has this being shown any signs of life?

Colgrove stresses that if the answers to both questions are affirmative, then such a being is born.

However, Romanis' view of the concept of birth is different. Romanis criticises Colgrove's view of birth, arguing that the WHO definition delineates two events. First, the expulsion of an entity from a pregnant person. Second, the emergence of that entity from the process of gestation. Thus, Romanis stresses that, at birth, there is an expulsion of a being from a mother's womb, and that this expulsion brings with it embryonic and fetal development. Normally these two things coincide, but Romanis argues that the process of embryonic and fetal development and the process of expulsion are two independent processes that do not necessarily coincide. For Colgrove, birth is basically an ex-womb existence. But for Romanis, a premature being developing in a partially gestated artificial womb is not yet a born being as it is not yet fully developed[180].

Moreover, for Romanis, there is something that differentiates a being in an incubator from a premature being still developing in an artificial womb. When Romanis discusses birth, she focuses on the exercise of independent living and points out that, in English law, breathing, including assisted breathing, has been the focus for determining independent living. Breathing after birth is readily observable, and shows an obvious capacity for sufficiency. Thus, for Romanis, a premature newborn in an incubator, although not fully developed,

[178] Nick, Colgrove (2019) "Artificial Wombs, Birth and "Birth": A Response to Romanis [online] *Journal of Medical Ethics* https://jme.bmj.com/content/46/8/554 [accessed 28 January 2021].
[179] Currently, as of 2021, this definition can be found on the website of the *Geneva Foundation for Medical Education and Research.* https://www.gfmer.ch/Medical_education_En/Live_birth_definition.htm#:~:text=In%20the%20World%20Health%20Organization's,such%20separation%2C%20breathes%20or%20shows
[180] Chloe Romanis, Elizabeth (2019) "Artificial womb technology and the significance of birth: why gestatelings are not newborns (or fetuses)" [online] *Journal of Medical Ethics* https://jme.bmj.com/content/45/11/728 [accessed 29 January 2021].

would be a newborn, exercising the independent exercise of breathing. Although this premature being breathes with problems and needs the help of ventilation in the incubator, he breathes on his own, otherwise, the incubator would not be able to keep him alive.

However, a premature being in an artificial womb does not breathe on its own, so the artificial womb keeps the being fully alive. Therefore, this being would only be born in a geographical sense. To test the degree of independence for a birth, Romanis comments that there are two tests that make a new being enter an independent life.

1) Interaction with the external environment. The significant feature of all biological adaptations at birth is that they are entities capable of surviving in the external environment. Unlike a newborn, a being in an artificial womb remains dependent on a process of creation in a temporary environment. Therefore, this being, unlike a newborn, has no interactions with other human beings.
2) The primitive signs that Colgrove mentions in the definition of birth, such as the heartbeat, are evident in a fetus, but a fetus is not self-sufficient. According to Romanis, it is absurd to treat primitive signs of life during gestation as evidence of self-sufficiency. The coordination of all bodily functions during gestation is always dependent on the gestational process, whether this is carried out by a woman or a machine. There is a useful contrast to be made between living human tissue and an organically integrated living human entity. Embryos are created by the fusion of living tissue, and following brain death, organs remain alive enough to transplant into another body. Therefore, it seems hardly intuitive to consider these tissues "actively living"[181].

Moreover, as we saw above, Colgrove argues that subjects who are inside an artificial womb of full gestation, i.e., who develop all the time there, are also born beings and deserve the same moral status as a newborn by being outside the mother's womb and showing signs of life. However, for Romanis, this seems implausible, since, according to her, if the right to equal treatment comes only from the fact of living outside the womb, then this logic suggests that an embryo that does not remain implanted in the womb would have been born as well. Thus, she argues that a subject that has been gestated in an artificial womb from the outset is not intuitively a born being, and therefore, if all subjects found inside an artificial womb are to be treated equally, then neither subjects in full ectogenesis are born, nor subjects in partial ectogenesis[182].

Therefore, in his view, artificial wombs could be considered enhancement technologies, since they are subjects that are not born jet. However, this would not be the case in Colgrove's view.

[181] Chloe Romanis, Elizabeth (2019) "Artificial womb technology and the significance of birth: why gestatelings are not newborns (or fetuses)".
[182] Ibid.

3.5.4. The moral status of being in the artificial womb

In addition to the issues mentioned above, another question to highlight in artificial wombs is the moral status that a being in one of them should have. According to Colgrove, as we saw in the previous section, this kind of subject has the same moral status as a newborn, and should therefore be considered as such. However, according to Romanis, the subject inside an artificial womb cannot be considered a newborn, but neither can it be considered a fetus, so we are dealing with a subject that possesses a unique entity. Romanis calls this type of subject a "gestateling", being different from newborns in that they do not exercise an independent life[183] .

Romanis points out that there is generally a dichotomy between two alternative explanations of moral status. Some say that all human life is intrinsically valuable, while others believe that the life of persons (and not of developing entities) has intrinsic value. This difference of views is highlighted most when we deal with issues such as abortion, and there is little hope for a unilateral resolution to the value of the developing human entity. Among the moral issues we encounter related to artificial wombs and gestatelings, Romanis says, are when to deactivate an artificial womb, bearing in mind that in doing so, if a gestateling is inside it, it would die, or how to select participants for such an innovative technology. It, therefore, highlights the need to give the gestateling an individual moral status. However, assigning a moral status will not immediately tell us how to treat the entities in question, because once a moral status is assigned, we will have to make moral judgments about whether the status justifies certain treatments.

However, beyond the moral status of gestateling, Romanis highlights that artificial wombs involve a decision-making process that may be important for people with the capacity to gestate. The location of a future human entity matters because when it is located within a person's uterus, it significantly impacts that individual. The subjective preferences of the pregnant person must be respected and they must be allowed to make decisions about their body and gestation. Gestateling matters, Romanis points out, but so do the pregnant women. Therefore, Romanis concludes that whether to opt for an artificial womb or not, and in what circumstances, is a decision that a woman should be able to make, and this should be allowed, and this decision should be taken as something important, rather than the approach towards gestateling[184].

3.6. Criticisms of enhancement technologies

The four enhancement technologies mentioned above may bring many advances for the reproductive freedoms of individuals, as well as for the new human beings that are to come in the near future. However, at the same time as these technologies could lead to great

[183] Chloe Romanis, Elizabeth (2019) "Artificial womb technology and the significance of birth: why gestatelings are not newborns (or fetuses)".
[184] Ibid.

scientific advances for society, they also raise a number of ethical and moral questions about their use, as well as criticisms from various philosophers and lawyers.

3.6.1. Leon Kass and the critique of cloning

One of the leading critics of cloning is Leon Kass, an American bioethicist at the University of Chicago. In 1997, one year after the birth of Dolly the sheep, Kass published the article "The Wisdom of Repugnance", in which he explains that cloning would dehumanize human beings, as the act of cloning is a narcissistic act that would result in human manufacturing.

According to Kass, there are three objections that must be considered when discussing cloning. First, cloning supposes a threat to the identity and individuality of the new being. Second, cloning represents a move from natural procreation to manufacture, this is, the production of babies as if they were artifacts, designed by human beings. Third, cloning represents a form of despotism by the cloners towards the cloned and thus represents a violation of the meaning of the parent-descendant relationship, of what it means to have offspring, and of what it means to say "yes" to our own death and replacement[185].

In the first objection, Kass argues that, because of what cloning means, one cannot assume that the clone will accept being a clone. This objection, Kass comments, goes beyond the point that a being, a product of cloning, can resent the fact that it was conceived as a clone because a clone cannot consent or not consent for having been a product of cloning. Kass comments that, in cloning, in addition to these possible resentments on the part of the clone, doubts arise about the necessary independence on the part of the clone to consent to the things that happen in its life, this is, not only the capacity to choose but the willingness and ability to choose freely and well. Therefore, it is not known to what extent a clone will be a moral agent.

For Kass, in the act of cloning and raising someone as a clone, the creators disrupt the independence of the cloned entity, starting with the aspect that naturally conceived offspring are a surprise and a gift to the world, whereas this is lost in clones, as they are not a surprise, but a designed project[186].

Cloning, therefore, creates serious problems of individuality and identity, because the clone may experience identity concerns in the sense that he is, among other things, an intentional twin of his or her own father who was born out of time. Thus, the clone is pigeonholed into an existing genotype, which may cause people to constantly compare it to the original being, and while it is true that the clone, due to the difference of time, will develop in a different environment compared to its original counterpart, Kass comments that one should expect parental and other efforts to mold and visualize this new being with its original counterpart in mind. In other words, Kass believes that people will see a clone not as a child of someone,

[185] Kass, Leon (1997) "The Wisdom of repugnance" [online] *The New Republic* https://web.stanford.edu/~mvr2j/sfsu09/extra/Kass2.pdf [accessed 22 January 2021].
[186] Ibid.

but as a projection of a person. This is why the act of cloning, for him, is a narcissistic act where one recreates oneself.

In the second objection, Kass comments that cloning involves a process that will be under control, in which someone's genetics are imprinted, and the clone is someone selected and determined by people who do the work of artisans. Thus, human nature succumbs to the technological project, and becomes material at the disposal of humans, and is left to the subjective prejudice of bioengineers.

In this way, Kass claims that the clone becomes a product, and like any product, no matter how excellent it is, the artisan is above it as a superior being. He also believes that the purpose of human cloning will end up being the same as the cloning of animals. In other words, those who clone animals know that they do so for an instrumental purpose to serve human purposes, and human cloning would be adapted to the same mentality and, therefore, clones will become artifacts.

Similarly, he says that genetics and reproductive companies will move into the commercial orbit once the Human Genome Project is completed. Cloning could generate a lot of demand, even before human cloning is perfected and possible, companies will have already invested in storing eggs, obtained through autopsy or ovarian surgery, performed embryo modification, and begun storing tissue for potential donors. Through the rental of surrogacy services, and through the purchase and sale of tissues and embryos, priced according to the merit of the donor, human commodification will be unstoppable[187].

Finally, in the third objection, Kass considers that the practice of cloning aggravates the misunderstanding of the meaning of having offspring and the parental/maternal relationship. For him, embracing procreation means abandoning our control in order to find immortality for the human species. In other words, through human reproduction we continue the cycle of life, in which some are born and others die, thus enduring the human species constantly. According to Kass, when a couple decides to have offspring, then they choose to have a baby, whoever it turns out to be. The offspring are people like us, so they are not our possessions or property. Therefore, they will live their own lives, not ours. Therefore, in this way we seek to guide them to follow their own paths.

Those parents who want to live for their children, who force them to fulfill those frustrated dreams they could not achieve, have already done a lot of damage, says Kass. Moreover, if parents have hopes for their offspring, cloning will raise expectations for them. In cloning, future parents make an authoritarian decision, which contradicts the nature of relationships between parents and the offspring, because the offspring is given an existing genotype, with the expectation that the project of a past life can control the life of a future being. Thus, Kass sees cloning as inherently despotic, because it seeks to make a baby in someone's image, with the baby's future subject to one's will. Thus, despotism in cloning, according to him, will be inevitable.

[187] Kass, Leon (1997) "The Wisdom of repugnance".

It is also worth noting that, in addition to Kass's three objections, there is still a long way to go before cloning can be done safely. In 1996, when Dolly was created, it took more than 300 attempts to clone a sheep through somatic cell transfer. By 2018 these figures had improved, but they are still too poor, with only 0.5% to 5% of implanted oocytes giving rise to new beings[188]. In addition to this, cloning in many cases gives rise to beings with serious diseases, such as *Large Offspring Syndrome.* In this disease, cloned beings, in a fetal state, grow three times larger than their original counterparts, and their oversized bodies have elongated organs, which can have fatal consequences for the beings that gestate the clone[189]. The cause of clone elongation is believed to be incomplete gene reprogramming, because the DNA that is transferred is expected to be ready to give rise to a new being within minutes or hours after being extracted from a cell, whereas originally, in mammals, an egg can take years to mature inside the ovaries. Because of the speed at which clones are created, the reprogramming of genes for the purpose of fetal development could be incomplete.

3.6.2. Biometrics and Doogie's dark side

We talked earlier about biometrics and PGD as an enhancement technology, and about the Doogie mice as an experiment in this area by Joe Tsien's team of researchers. The creation of these mice, which carry the extra NR2B gene, seemed at first glance to be a success. However, producing genetic modifications, which do not occur naturally, can have risks and lead to unforeseen consequences.

A team of researchers led by Min Zhou, a medical researcher at the University of Washington, experimented on mice modified as Doogie mice. The researchers injected harmful substances into the paws of Doogie mice and normal mice. They found that the Doogie mice continued to lick the affected paw longer than normal mice, leading them to suspect that the pain was worse for them. Zhou's team concluded that the Doogie mice remembered sensations such as pain better, as the extra NR2B gene causes the pain to be more intense. However, Tsien responds to this criticism by arguing that the memory of pain does not make the pain more intense.

As we can see, the disagreement between Tsien and Zhou centers on whether Doogie mice feel more pain or remember pain better. Scientists have focused on the issue of pain according to the behavior of the affected being and its neural correlates. But also, whether one feels pain or pleasure is a subjective issue that has been discussed by various philosophers. Therefore, it is not clear whether Doogie mice feel more physical pain than normal mice. However, it seems that their "enhanced memory" causes them some degree of suffering, as they lick their paws for longer[190].

Moreover, as Agar says, the only way to see if the PGD technique is truly beneficial would be to test it on human embryos and subject them to the same tests that were carried out on

[188] Soniewicka, Marta, et al. (2018) *The Ethics of Reproductive Genetics.* p: 139
[189] Agar, Nicholas (2004) *Liberal Eugenics.* p: 33
[190] Ibid. p: 40

the Doogie mice. Let's imagine for a moment that Tsien is right and the extra NR2B gene does not cause extra pain in the mice. Given this success, the next step would be to do the same tests on animals that are more like us, such as chimpanzees. However, the genetics of a chimpanzee, although 98.5% similar to ours, are not entirely identical for that 1.5% difference, which will lead to uncertainty. Moreover, because of the differences in intelligence between the two species, it is to be expected that the result of the extra NR2B gene will be different in us[191].

3.6.3. The ethical and technical dangers of CRISPR technologies

CRISPR technologies are not only a source of uncertainty for us due to their novelty and the lack of knowledge we have about them, but they can also be used in a malicious way. For example, Lluis Montoliu comments that thanks to CRISPR, actions such as the modification of mosquitoes could be carried out for bioterrorist or industrial terrorism purposes.

Furthermore, the use of CRISPR technologies to carry out modifications on human embryos raises many ethical issues. Montoliu himself considers that it would be a mistake to try to modify embryos by means of CRISPR because there is no medical or biological need for it. He, therefore, considers that CRISPR modifications of embryos are neither technically nor ethically justified[192].

An example of these ethical problems can be seen in the apoE gene. There are variants of this gene that are associated with different chances of developing Alzheimer's. However, the most protective variant of this gene against Alzheimer's appears, at the same time, to increase cardiovascular risk[193]. So what would be the right thing to do in this situation? To genetically enhance a fetus through CRISPR technologies in order to prevent Alzheimer's disease in the future at the cost of increasing the chances of cardiovascular problems? Or should we leave these genes intact knowing what they may cause in the future?

In addition to the ethical problems mentioned above, Montoliu highlights two technical problems with CRISPR. The first is the so-called *off-target.* This technical problem occurs when the cuts in the DNA by means of CRISPR are made in unwanted areas. Montoliu clarifies that this technical problem can be controlled. However, the second technical problem is the so-called *on-target.* This technical problem occurs when, by means of CRISPR, alterations are produced at the desired site. The latter can lead to dangerous mutations.

In addition to these problems, the companies "Sherlock Biosciences" and "Mammoth Biosciences" face the problem of getting the components of the technique into the cells. Montoliu says that for this activity, very harmless viruses are usually used, which transport

[191] Agar, Nicholas (2004) *Liberal Eugenics.* p: 175
[192] Méndez, Jesús (2017) "El editor genético CRISPR explicado para principiantes".
[193] Ibid.

and introduce them without inserting themselves into the DNA. There is research on how to do this with nanotechnology, but the effectiveness is limited.

3.6.4 Criticism of artificial wombs

Although artificial wombs are very recent and just beginning to awaken, since at least the first half of the 20th century, the idea of gestation outside the mother's body has been severely criticized.

The British philosopher and writer Aldous Huxley, in his novel *Brave New World,* originally published in 1932*,* tells about a futuristic and dystopian world in which human beings are divided into five classes: alpha, beta, gamma, delta, and epsilon. Each of these classes is assigned a different function in society, all of them the product of artificial reproduction in which a container full of eggs is immersed in a soup of sperm. Once the eggs have been fertilized, they will be divided into the five classes mentioned above. The zygotes that are destined to give rise to alpha and beta human beings will be placed directly into artificial wombs for development and subsequent birth, while those zygotes destined to give rise to gamma, delta, and epsilon human beings are subjected to a process called the "Bokanovsky Process", this, a process in which one zygote is divided into 96 identical zygotes. After this process, all of them, as well as the alphas and betas, will be placed in artificial wombs for development and birth[194].

In his novel, Huxley depicts artificial wombs as a means that is part of a process of mechanization and industrialization of people. The human being ceases to be properly a complex species of animal and is transformed into a product or artifact that has no thoughts of its own or ends of its own but follows a set series of established orders: the end of society is sought through that individual. The human being, therefore, ceases to be an end in himself and becomes a tool of the state, lacking own emotions and sensations, all of which are reduced to the consumption of a drug called Soma.

Because of the constant use of artificial wombs in the novel, human beings have stopped reproducing sexually, which has led to a complete transformation of social relations. Terms such as "father" or "mother" no longer exist in the world. Neither do marriages or monogamy exist. Everyone belongs to everyone, and everyone has sexual relations with everyone; it is apparently not possible to maintain relations with one person for long, having to constantly change partners. There is no individuality. Everything is collective. Moreover, since sexual reproduction is extinct, acts such as breastfeeding a baby are seen as aberrant. If any woman, for whatever reason, becomes pregnant, she is accused of being uncivilized. Huxley's novel always stresses the phrase "Civilisation is Sterilisation".

Thus, Huxley, in his work, shows artificial wombs as a tool that can distort our social and affective relationships. Artificial wombs may thus change our perception of human society,

[194] Huxley, Aldous (1932) *Brave New World.* United Kingdom, Penguin Modern Classics. p: 15-17

and how we should relate to our fellow human beings. Thus, his work implies that artificial wombs are a step towards dehumanizing humanity.

In addition to Huxley, another author who has been critical of artificial wombs is the French biophysicist and philosopher of Algerian origin, Henri Atlan. In an interview with Atlan, reported in the Spanish newspaper El País, he says that artificial wombs could bring about an equality between men and women that has not yet been achieved, as women will only participate in procreation through the egg, just as men do with their sperm. Women will no longer have to bear the heavy burden of conception. However, he also comments that artificial wombs will deprive women of the privilege of motherhood, deprive them of the carnal closeness to their offspring, and the happiness of motherhood and childbirth[195]. Thus, for Atlan, artificial wombs could add rights and privileges to women while taking away others.

He also comments that with artificial wombs what is to come might no longer be seen as "flesh of my flesh", transforming therefore the carnal relationship between a mother and her offspring. Thus, from his perspective, the big question that artificial wombs will raise will be about the relationship between adulthood and childhood. Atlan believes that the disappearance of the carnal bond between mother and child risks reinforcing a form of adult selfishness and leading to attitudes of abandonment of children, even their instrumentalization. It is therefore by virtue of this type of relationship that we will judge whether artificial wombs are positive or negative for us[196].

Finally, he concludes that, with these technologies, representations of the sexual genders will also change, insofar as women, until now, have never been able to free themselves from the need to carry within them the beings to come, which will cause the symbolic image of the genders to change, and new ways of conceiving men and women will appear, causing the relations between them to evolve.

[195] Federic Joignot (2005) "Niños de máquina" [online] *El País* https://elpais.com/diario/2005/06/12/eps/1118557609_850215.html [accessed 30 January 2021].
[196] Ibid.

4. POLICIES IN LIBERAL EUGENICS AND ENHANCEMENT TECHNOLOGIES

In the previous chapters, the concept of liberal eugenics was introduced, as well as the enhancement technologies that can be found in this philosophical field: technologies such as cloning, preimplantation genetic diagnosis, CRISPR technologies, and artificial wombs. We saw how they worked and described some examples of how they have worked.

This chapter will focus on how liberal eugenics and the enhancement technologies might be applied in a social context, this is, how a genetically engineered society would be, what political models might be used for our society, what degree of freedom the future parents should have regarding genetically modifying offspring, and what reproductive freedoms citizens should possess. The proposals that have been made in each of the above areas, and what can be salvaged from them, will be analyzed.

4.1. Equal opportunities and distributive justice

One of the first points to consider when talking about justice in a society with access to enhancement technologies is how to establish proper equality of opportunity in citizenship.

Philosopher Allen Buchanan argues that in order to bring about such equality in a state, it is necessary to protect individuals against that which might limit their life chances on the basis of gender, race, ethnicity, religion, etc.[197] Nevertheless, while Buchanan points out that this idea is necessary, it is insufficient. There is also a need to apply the *Level Playing Field Conception*, coined by the American economist John Roemer. This concept refers to the need to eliminate or diminish the influence of external factors that limit citizens' opportunities for discriminatory reasons. In other words, Level Playing Field Conception refers to the need for social equity and a fair balance in order to achieve equality of opportunity[198].

This concept can have important implications in the health field. Authors such as Norman Daniels point out that it is important that the health system strives for removing barriers that prevent people with certain diseases from achieving equal opportunities with other people. Similarly, the Level Playing Field Conception can also have direct implications for genetic interventions, which can function as a means to achieve such equality. Genetic interventions, whether for therapy or enhancement, should equalize the life chances of all citizens for the better and not for the worse, so that future individuals who will be born with physical or psychological problems should have the same life chances as people who do not suffer from

[197] Buchanan, et al. (2000) *From chance to choice: genetics and justice.* United Kingdom, Cambridge University Press. p: 16
[198] Ibid. p: 16

these handicaps and not the other way around. It is therefore necessary that such interventions are available to all[199].

4.1.1. Forms of Level Playing Field Conception

Level Playing Field Conception can be interpreted in many ways. Some suggest that it is necessary to distribute social goods (material, economic, etc.) in an equitable way in order to compensate those who possess fewer natural goods[200], either because of illness or disability. Now, however, with the new enhancement technologies, there is the possibility of altering the natural goods themselves. Therefore, one question we face when trying to distribute justice to a country's citizenry is whether it is necessary to distribute not only social goods but also natural goods.

In order to understand this problem, it is necessary to expose the notion of *Social Primary Goods* by John Rawls, professor of political philosophy at Harvard University. According to Rawls, every society must possess five social primary goods.

I) Basic freedoms, such as freedom of thought, freedom of conscience, freedom of association, etc. These freedoms are the necessary background for the development and exercise of the capacity to decide, review, and pursue a conception of the good. Likewise, these freedoms allow the development and exercise of a sense of right and justice under free political and social conditions.
II) Freedom of movement and choice of job in a background of diverse opportunities. This freedom is fundamental to the pursuit of a final purpose, as well as to review that final purpose and change it if one desires that.
III) Powers and privileges in jobs and positions of responsibility. These powers are necessary to provide freedom for the social and autonomous capacities of the individual in a position of power in a given sector or enterprise.
IV) Right to income and wealth, which are useful means for any kind of purpose (having exchange value) to directly or indirectly achieve a wide range of objectives.
V) Social foundations for self-respect. These are those basic, usually essential, aspects for citizens to have a lively sense of their own value as moral beings and to be able to acknowledge their own interests and advance in their goals with self-confidence.[201]

However, Rawls does not include in his Social Primary Goods the distribution of natural goods to the population, such as physical or psychological capacities. In contrast, other authors, such as the bioethicist Dov Fox, claim the need for regulating genetic modifications through what he calls *Natural Primary goods.* For Fox, these goods are those natural traits

[199] Buchanan, et al. (2000) *From chance to choice.* p: 16
[200] By natural goods we mean those natural traits that we possess that can put us at an advantage compared to others or, alternatively, that at least do not put us at a disadvantage compared to others.
[201] Rawls, John (1982) "Social unity and primary goods" in Willams Bernard, Sen Amartya. *Utilitarianism and beyond,* United States, Cambridge University Press, pp: 159-186.

that are useful for any kind of life[202]. Some examples would be immunity to disease, increased resistance to injury, optimal memory, etc.

The question then is: is the addition of natural goods by means of enhancement technologies necessary to achieve a more just society? Can a good form of justice distribution be achieved with enhancement technologies or should we do this without them? To analyze these questions, Buchanan discusses two forms of Level Playing Field Conception.

The first form claims that in societies, such as those in the West, an individual's success or failure will be significantly influenced by the effects of an unjust social structure, which greatly disadvantages certain sectors of the population, such as, for example, the African-American community in the United States. In this version of *Level Playing Field Conception,* it is argued that the opportunity-limiting effect of the "social lottery", this is, the distribution of social goods, should be counteracted as far as possible. Rawls seems to defend this position arguing that "those who are at the same level of talent and ability, and have the same disposition to use it, should have the same chances of success despite their initial place in the social system"[203]. Buchanan calls this form "social structural view".

The second form is based on the moral intuition, or considered judgment, that people should not have fewer opportunities because of factors beyond their control, this is, factors that are not chosen. This form is called "brute luck view". According to it, as in the social structural view, people should not have fewer opportunities because of a "social lottery". However, in the "natural lottery", understood as the distribution of natural assets or talents, the two views differ. The social structural view has no direct implications for inequality of opportunity resulting from the "natural lottery". However, the brute luck view does, because in this view equality of opportunity requires efforts to counteract the effects of all factors beyond the individual's control, and if something is beyond the individual's control it is the way in which the individual is affected by the natural lottery[204].

As it can be seen, the social structural view has purely social implications and argues that jobs in a society should be occupied by those people who possess the necessary skills for them, no matter their race, gender, beliefs, etc. On the other hand, the brute luck view is simpler and more straightforward. This view considers social and natural implications and argues that everyone should have an equal chance of getting a job, no matter how the natural lottery has affected each of us. In other words, an individual with physical or psychological handicaps should be able to have the same job opportunities as an individual without such handicaps[205]. If the natural inequalities, mentioned by the brute luck view, are limiting in terms of an individual's life chances, then they are a matter of justice.

[202] Fox, Dov. (2007) "The illiberality of Liberal Eugenics", *Blackwell Publishing,* vol. XX, 0034-0006
[203] Buchanan, et al. (2000) *From chance to choice.* p: 66
[204] Ibid. p: 67
[205] The brute luck view can be very utopian in terms of wanting someone with a disease or disability to have the same job opportunities as someone without them. It is not very realistic that, for example, someone with a hearing impairment since birth can pursue a career in music in the same way as someone without a hearing impairment.

One of the proponents of the brute luck view is John Roemer. He claims that there are psychological factors, such as emotional cyclicality, that can make it more difficult for a child to succeed in school. This condition is beyond his control, and while Roemer does not recognize emotional cyclicality as a disease, he does believe that something should be done to give that child the same opportunities as other children[206]. Therefore, what is important is not whether the condition we are talking about is a disease or not, but whether it limits life chances for an individual.

On the other hand, advocates of the social structural view include Norman Daniels and Allen Buchanan. In many cases, illness is the result of bad luck in the natural lottery, not the effect of social structure. But the social structural view has no direct implications for counteracting natural inequalities. However, when studying a society's equality of opportunity it is possible to think that a participating member of the same society must have the characteristics of a "normal competitor" for a desirable social position. An illness or disability may prevent an individual from being a "normal competitor". Therefore, in this position, equality of opportunity can be thought of as something that concerns not only the limitations caused by the defects of social structures but also as something that concerns the cure and prevention of illnesses. In this way, Allen Buchanan and Norman Daniels eliminate the need to defend the brute luck view[207]. In other words, both consider that equality of opportunity is about ensuring fair competition for those who are able to compete, and about preventing and curing disease so that no one is left out of the competition. Therefore, in the social structural view, the enhancement technologies could be useful tools to prevent a future being from being left out of the competition because of physical or psychological handicaps.

However, these same authors consider that making adults with illnesses or disabilities equal in opportunity to those without may be problematic due to two factors.

1) What counts as illness or disability in a society is not only determined by the biological conditions of an individual but by the social structure of that society as well. The characteristics of the people cooperating in a society can make a difference as to what counts as a disability and what does not.
2) Buchanan and Daniels consider that equalizing opportunities for people with physical and psychological handicaps, rather than socially striving to remove them so that they can compete as much as possible with people without handicaps, may reveal a failure in the appreciation of the value of pluralism, or diversity of good. What we see as natural good or natural deficit depends in part on what we assume to be good for human life[208].

[206] Buchanan, et al. (2000) *From chance to choice*. p: 72
[207] Ibid. pp: 73-74
[208] Ibid. p: 79-80.

4.1.2. Distributive justice

In order to be able to speak clearly about the distribution of social goods and natural goods, it is necessary to ask what distributive justice would look like in a society with access to enhancement technologies, as well as what individuals should expect from the provision of genetic services.

First, every individual in society has a right to health. Therefore, distributive justice, as Daniel Wikler points out, requires social policies that ensure that all individuals have access to health services[209]. But he also points out that the right to access good health care incorporates the need to include genetic services within these services[210], for example, gene therapy services. This would require expanding the training of scientists in genetic clinics and building up an infrastructure formed by counselors, testing and research laboratories, as well as encouraging research to identify such needs in advance.

These supposed needs are not covered in countries such as the United States, where there is no public health care, and not all citizens have sufficient capital for being able to afford health insurance. For this reason, Wikler, together with Buchanan, Daniels, and Brock, agree on the need to implement a public health service in a country, including genetic services[211], in order to provide equal opportunities for all citizens, this is, every individual has the right to the life they want. To this end, it is important to provide genetic and health information[212].

However, genetic services may also suppose a risk, such as causing a person, because of the results of a genetic test, to be unable to complete his or her own desired life plan[213]. For example, a citizen could be excluded from a job in a company because of bad results in such a test. Similarly, there are also a number of genes whose significance is uncertain in a test like this[214].

Regarding genetic tests, Wickler argues that they could be excluded from public health care because of their high cost, either because they are tests whose results and predictions are uncertain, or because, even if these predictions are reasonably certain and comprehensible, their results may not be useful for a life plan, medical or otherwise. Similarly, what public health services may not be able to provide, are genetic modifications that are not aimed at diseases, but at improvements of the organism or other changes in the patient's constitution. This is because, according to Wikler, these are requirements for contingent and idiosyncratic projects, rather than for life courses[215].

[209] Buchanan, et al. (2000) *From chance to choice*. p: 309
[210] Ibid. p: 310
[211] Ibid. p: 312
[212] For example, a healthy woman might decide not to have children, despite her desire to do so, because of her fear of passing bad genes to the offspring, thus denying the completion of a potential life project. The same could happen to a man whose life has taken a turn because of the mistaken expectation that his life will be shortened by an inherited condition that killed his relatives.
[213] Buchanan, et al. (2000) *From chance to choice*. p: 313
[214] In 2000, the BRCA1 and BRCA2 genes were considered to be of uncertain significance in a genetic test.
[215] Buchanan, et al. (2000) *From chance to choice*. p: 313-314.

4.2. Public health model vs. personal service model

Within the possible policies for building a society with the enhancement technologies, there are two perspectives for genetic intervention: the public health model and the personal service model.

Firstly, the public health model emphasizes the production of benefits and the avoidance of harm to groups. It assumes that the appropriate way to evaluate options is according to the balance of cost and benefit. This model recognizes that there is an ethical dimension to decisions about the application of scientific and technological knowledge, and at the same time, it assumes that sound, ethical reasoning is exclusively consequentialist (or utilitarian) in nature. In other words, it assumes that a policy or action is good depending on its cost-benefit balance[216], which means that sometimes some people will have to be harmed in order to benefit others, because in this model what matters is the sum.

One of the criticisms of this model, as Buchanan argues, is that such reasoning is insensitive because it fails to take seriously the separation and inviolability of persons. By considering the balance of "benefit and damage" exclusively, it fails to recognize justice in the distribution of burdens and benefits. In certain circumstances, it sacrifices the fundamental goods of individuals for a common good and fails to appreciate that each individual is a distinctive and irreducible subject of moral concern. The public model thus publicly endorses the view that genetic tests and interventions are simply services offered to individuals (private consumer goods) that can be accepted or rejected. Therefore, genetic intervention moves from the public sphere to private choice.

Secondly, the personal service model serves as a bastion against the excess of the crude consequentialist ethical reasoning of the public health model. The fundamental value of this model lies in individual autonomy. However, this model, according to Allen Buchanan, has serious problems: while it is an alternative model to the public health model, it comes at a prohibitive price, and it ignores the obligation to prevent harm, as well as the most basic requirements of justice. By privileging autonomy over all other values, the personal service model offers a myopic view of the moral landscape. Thus, this model, in reality, only gives autonomy to those who are in a position to choose the genetic intervention[217]. At the same time, if such choices are treated as private consumer goods, then the cumulative effects of such choices could limit the autonomy of many people (there would be very strict requirements for jobs, and stigmas for those who sire defective children when this could have been avoided). In addition, there would be unequal opportunities for the use of enhancement technologies, as only the rich would have enough money to use them. This model thus provides autonomy to some at the expense of others.

[216] Buchanan, et al. (2000) *From chance to choice.* p: 11
[217] Ibid. p: 13

4.2.1. Difficulties in distinguishing between models

As can be seen, the public health model focuses on society, while the personal service model focuses on the individual. Can the interests of the two models be distinguished? To address this question, Wikler appeals to the following positions.

a) I am in favor of genetic intervention because I want my offspring to have the best genes.
b) We are in favor of genetic interventions (on behalf of each of us) because we want our offspring to have the best genes.
c) I am in favor of genetic interventions (for each person in our group) because I want our offspring to have the best genes.[218]

On the basis of these statements, Wikler points out that if it is accepted that "a" is morally acceptable, then it does not become unacceptable when it is expressed by many people (in the form of "b"). Therefore, how can we blame a person for endorsing that group's desire "c"? "b" and "c" are simply the aggregate of many instances of "a". One might expect a legislator funding a measure that provides genetic services to a large number of people to say and defend something like "c", so differentiating the interests of one model and the other can be confusing at times.

A further difficulty in distinguishing the perspective of the "public health model" from that of the "personal service model" arises in the cost-benefit calculation. Here, we must have in mind that cost-benefit arguments in the area of genetics do not necessarily imply a willingness to sacrifice someone for the betterment of another. If a cost-benefit analysis is offered in favor of a genetic screening program or other intervention that shows that the sum total benefit is greater than the cost, the intended message should not be that genetic services should be offered to save money. The goal should be to ensure that as many newborns as possible have genes that give them a good life[219].

The cost-benefit calculus is a key issue in debates about what merits primary health care and what does not. However, as we have been observing, drawing a line between individual and social purposes, as between public health and personal service models, is not always straightforward[220].

4.2.2. The third way

Between the public health model and the personal service model, Buchanan points out that there is a third way of looking at things: we can take ownership of the personal service model in general and, at the same time, erect a moral firewall to limit individuals' free choice in certain areas. For example, some bioethicists suggest that cloning should be forbidden, as we saw with Leon Kass in chapter 3 of this thesis. Thus, in each case, the moral firewall shows

[218] Buchanan, et al. (2000) *From chance to choice*. p: 53
[219] Ibid. p: 54
[220] Ibid. p: 55

a distrust of the personal service model, but at the same time tries to give a systematic and exemplary explanation of why and how individuals' choices should be limited.

Buchanan, together with Daniels, Wikler, and Brock attempts to develop a moral framework for choices related to the use of enhancement technologies. The view they advocate lies between the public health model, in which individuals only count insofar as they are affected by the genetic health of society, and the personal service model, in which the choice to use enhancement technologies is morally equivalent to the decision to purchase goods for private consumption in a market[221].

4.3. The role of progenitors and bioengineers

When discussing the politics of liberal eugenics, it is important to note what role parents will play in a society with enhancement technologies at their disposal. Obviously, all minimally coherent parents want the best for their children, and will, in turn, want their children to be the best they can be. In a country that approves liberal eugenic ideas, parents would be allowed to modify their future offspring if that is their will. If this is the case, why should one not seek to have the best offspring possible? And, in turn, if it is decided to have improved offspring, what is the best, and who decides?

According to Daniels and Brock, a position in favor of the enhancement technologies might argue that genetically enhancing offspring is morally required to produce the best possible offspring. This position, therefore, emphasizes parental responsibility for genetic modification and points out that if parents are looking out for their own interests in the future offspring, then this is not the same as doing all one can for a future child[222]. In other words, Daniels and Brock argue that if we seek the best for future offspring, then we must act in their best interests, not in our own best interests as parents or in the best interests of society.

However, when we are tempted to defend the right of parents to use enhancement technologies, two questions arise. First, is the use of enhancement technologies to improve future human beings as morally acceptable as parents improving their children's environment for their children? Second, if some genetic interventions are undesirable because they are not well balanced (this is, more is lost than gained), is it morally permissible for parents to use them because they have the authority to do so?

In relation to the second question, Daniels and Brock, like Fox, point out that when modifying the future offspring we should think of modifications that are beneficial *per se*, independent of the decisions that offspring may make in the future[223]. One trait that exemplifies this is eyesight, a valuable trait for any lifestyle. Although a person can have a fulfilling life even if they do not possess it, or lose it, the fact is that not seeing greatly diminishes our range of life choices and opportunities.

[221] Buchanan, et al. (2000) *From chance to choice*. p: 14
[222] Ibid. p: 161-162
[223] Ibid. p: 167-168

Daniels and Brock consider that a completely neutral position between different conceptions of what the good life is in all actions and policies is not possible[224]. It is difficult, therefore, to establish a middle ground regarding what parents can and cannot do with enhancement technologies, and what a liberal democratic state should or should not allow in these situations. Nevertheless, it seems possible to reach some consensus.

Joel Feinberg, a political philosopher and professor of philosophy at the University of Arizona, speaks about the concept of a "right to an open future" for the offspring on the part of the parents. This concept refers to the idea that parents should raise children so that they have the capacity for practical judgment and autonomous choice, as well as a wide range of skills for a broad repertoire of possible life plans[225]. It is therefore inappropriate for parents to limit the range of future life paths for their offspring because of their view of what the good life is[226]. At this point, some might argue that there should be no moral limits to raising their children in their own image, but the real problem is that this may come at a cost to their children's wellbeing.

4.3.1. The danger of communitarian eugenics

A serious problem we might encounter in granting rights to the parents in relation to enhancement technologies is one similar to something caused by the old eugenics, but this time without the intervention of the state. In a liberal eugenic country, different communities could exert some peer pressure on parents to act with enhancement technologies in a certain way. Daniels and Brock call this phenomenon "community eugenics"[227]. This form of eugenics can undermine the possibility of social cooperation between communities within a liberal state and, with genetic alteration, future offspring may see themselves trapped in the ideals of a particular community because of its beliefs and values.

According to these authors, the threat of a communitarian eugenics comes from communities that believe that they do not share a common human nature. The result of this belief may be the existence of different communities constituted on the basis of genetic differences, differences understood as irreconcilable. In this situation, any engagement with another community and its values may be seen as a threat to the identity of that group. Added to this is the lack of reciprocity between the different communities in appreciating each other's values[228].

[224] Buchanan, et al. (2000) *From chance to choice*. p: 169
[225] Ibid. p: 170
[226] A prominent case is the "Wisconsin v. Yoder" case, in which the Amish community (a Protestant ethno-religious community) wanted their children to stop going to school at the age of ten on the grounds that beyond that age education was not necessary for their way of life. In this example, the parents, by their conception of what a good life is, narrowed the range of possible future life paths for their children.
[227] Buchanan, et al. (2000) *From chance to choice*. p: 177.
[228] Ibid. p: 178

The danger of a social group genetically closing itself off from the rest of society is not only for future individuals but for the whole basis of social cooperation that includes respect for individual freedoms and tolerance of those who are different[229].

4.3.2. Limits of what is permissible for parents

Therefore, where are the limits to pursuing what is best for our offspring? Is it possible to have a society rich in a plurality of worldviews and, at the same time, to have regulated limits in the field of genetics that parents can accept?

First, as was discussed in previous chapters, liberal eugenics is characterized by the defense of pluralistic thinking about what is best and most appropriate. As such, parents should be allowed some freedom to seek what they believe is best for their offspring, but having in mind that the right to an open future for children implies some restrictions on genetic and environmental pursuits. Parents, as we saw earlier, must seek what is best for their offspring and not what is best for themselves when they face these decisions.

In this sense, Brock and Daniels point to three statements that imply the need for greater constraints for those in the field of bioengineering:

1) The pursuit of competitive advantage by means of enhancement technologies will be, in important cases, collectively counterproductive and therefore harmful to everyone.
2) Allowing a market to determine who can pursue a competitive advantage will be unfair to those who lack the means.
3) The pursuit of the best (with the exception of eliminating or preventing disease or disability) will in itself generally involve unfavorable risk-to-benefit ratios[230].

Some parents might wish, for example, that their children were taller. However, when we talk about the advantage of being tall, we are not talking about something that will necessarily bring us some good in our lives, but an advantage that has an effect insofar as other people do not have it. Height is therefore a competitive advantage. Likewise, if we all get the advantage of being tall, then this advantage would be reduced to nothing. The fact that we are all tall, argue Daniels and Brock, would entail a cost overhead in our society: bigger cars would have to be built, houses would have to be built with higher floors, etc.[231]

However, some authors, such as Nicholas Agar, point out that there are competitive advantages that, in addition to serving for competition, can help us to live an independent life. For Agar, traits such as intelligence and height represent competitive advantages and, at the same time, improvements that can help us in our independence as individuals. In the case

[229] Buchanan, et al. (2000) *From chance to choice*. p: 178
[230] Ibid. p: 181.
[231] Ibid. p. 185

of height, Agar comments that thanks to the height we can reach objects that we would not be able to reach if we were short[232].

While Daniels and Brock's assessment of height is different from Agar's, all three authors agree that there are traits that are useful for human independence, whether they have competitive value or not, such as immunity to disease or memory.

The quest for improvement can, however, have destructive consequences. Agar comments that some competitions are "winner-take-all" competitions. This is the case in the Olympics, where there are competitions in which many athletes compete against each other, but three of them will win medals and only one will be the winner of the contest. In this situation, says Agar, while it should not be forbidden for parents to genetically modify their future offspring for their own good, it should be prevented that the improvements are oriented towards this type of competition[233].

But how do we know that parents intend to modify their future offspring with such competitions in mind? According to Agar, our judgment can discern whether the dominant effect of the attribute that parents seek for their future offspring is due to their intention to prepare them for a "winner-takes-all" competition. Why? Because the choice of an attribute, and its purpose, depends on the society into which the individual will be integrated: on its values, not on the value of the parents[234].

In any case, allowing parents to choose to modify the future offspring for competitive reasons is, according to Agar, unethical for two reasons. The first is that such enhancements would limit the autonomy of the new individual; the second is that such modifications would put groups of parents in constant competition with each other[235].

Regarding the second statement, if the technology to achieve "the best" is not available to the entire citizenry, then severe problems of justice will arise that could divide society into genetic ghettos. In a society, it is important to establish a state in which we can compete on equal terms for a desired job and a desired way of life. It is therefore important to re-establish the status of "equal competitor" for those whose life chances are diminished because of illness or disability.

If, as Daniels and Brock argue, not everyone can play an equal role in society as an equal competitor, if the disadvantages between citizens cannot be reduced because there are health treatments that only the wealthy can afford, then many will feel this situation is unfair[236].

On this point, Daniels and Brock note that three factors affect the judgments we make about the difference in access to enhancement technologies.

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[232] Agar, Nicholas (2004) *Liberal Eugenics. In defense of Human enhancement. United* States, Blackwell Publishing. p: 127
[233] Ibid. p: 130
[234] Ibid. p: 130
[235] Ibid. p: 131
[236] Buchanan, et al. (2000) *From chance to choice*. p: 188.

1) If we believe that the socio-economic inequalities that exist in a social arrangement, this is, within a society, are themselves unjust, for example as a result of discriminatory practices (sexist, racist, etc.), then exacerbating these inequalities through advantages resulting from genetic modifications for treatment or enhancement will result in a greater injustice.
2) If there is a structure of inequality in access to benefits, for example, a health system that rations beneficial services in favor of the poor (say 25% of the population) but then makes those services available to everyone else, it seems easy to criticize based on the injustice it perpetuates rather than those percentages of the population (the remaining 75%) who in the end receive an extra advantage.
3) The importance of the degree of benefit or advantage. In other words, if the competitive advantage in question provides the individual with minimal input, then other individuals will not make many claims if it is something that only the better-off can afford. But if the advantage is somewhat notable and decisive, then there will be more claims from society, and it will be argued that it is unfair[237].

Finally, to see how the three factors mentioned above affect the way we should think about justice, Daniels and Brock argue that we should explore the analogy between pursuing the best through genetic interventions, and pursuing the best by providing the best education we can for sons and daughters. In first-world countries, such as the United States, attending a public school or institute increases the chances of getting into an elite university such as Harvard. Consequently, this leads to better jobs, which leads to greater socio-economic advantages.

Even students from wealthier families may have some favorable treatment in order to have even more favorable conditions, so we see that economic inequalities also run through education as a commodity: the poorest will have little chance of getting into these elite institutions[238].

Brock and Daniels agree that reactions to this situation in the educational system reflect beliefs about the three factors mentioned above in connection with unequal access to genetic treatments or improvements. In their view, if we are concerned that the economic inequalities in our country are unfair, then we will think that the way they work with respect to education is also unfair. But if we think that the public education system is more or less adequate, because there is hardly any discrimination against certain sectors, then we will consider the problem of economic inequality to be less serious.

They also argue that if, on the contrary, we think that public schools eliminate the possibility of higher education for millions of people, then we would see many more problems in the structure of inequality. Moreover, if success in life is ultimately thought to consist only of advancing marginally through educational advantages, then the educational privileges of the economically better-off would be less of a concern. We would be, in the latter case according to them, less concerned about how educational advantages influence the market.

[237] Buchanan, et al. (2000) *From chance to choice*. p: 187-189.
[238] Ibid. p: 190

Therefore, our reaction to inequalities in the market for genetic interventions, as with education, will depend on the positions we have studied to defend in relation to these three factors. To the extent that inequalities in income and rent are very unfair, this will be a strong argument against the market for advantage. Likewise, to the extent that the disadvantaged are denied access to advantages, rather than the advantaged, this will also be a strong argument against the market. And to the extent that the advantages are indeed significant, in the sense that they confer increased opportunities on those who have them, and to the extent that everyone agrees that they are significant advantages, this is also a strong argument against a system in which they are only available to those who are better off[239].

4.4. Reproductive freedoms

Another important policy issue for a liberal eugenics state, related to the freedom of prospective parents, concerns their reproductive freedoms.

One of the major mistakes of the old eugenics was to infringe on the reproductive freedoms of many individuals. Today, in our present 21st century, these freedoms are again being challenged by the emergence of enhancement technologies. It is therefore appropriate to respond adequately to the challenge posed by these technologies. This requires an analysis of the scope and limits of human reproduction, as well as of the moral visions that surround it.

4.4.1. What are reproductive freedoms?

John Robertson, a former professor at the University of Texas School of Law, defines procreative freedoms as freedom in activities and choices related to procreation[240]. He calls these freedoms "reproductive freedoms". What kinds of activities does this set of freedoms encompass? Can reproductive freedoms clash with other important values, such as the prevention of harm? To answer these questions, Brock proposes to study its components.

In the field of political philosophy, when talking about the concept of "freedom", one distinction to keep in mind is the distinction between positive freedom and negative freedom. Negative freedom is the freedom that is given when a set of people do not act in a way that limits an individual's freedom. For example, our freedom to speak implies that others do not interrupt our speech when we are speaking. On the other hand, positive freedom is a freedom that may require a group of people to act to enable an individual to exercise his or her freedom. For example, a person's freedom to speak might require others to ensure access to the media in order for them to exercise that freedom[241].

[239] Buchanan, et al. (2000) *From chance to choice*. pp: 190-191.
[240] Ibid. p: 206
[241] Ibid. pp: 207-208

In reproductive freedom, both positive and negative freedoms exist. On the one hand, the state does not intervene in the reproductive decisions of individuals; and on the other hand, the individuals who are going to make such decisions are required to have genetic information in order to be able to choose. The ethical problem we face when studying these freedoms is: at what extent can positive and negative freedoms be extended, and at what point should the state interfere? To answer these questions, we will begin with the main features of reproductive freedoms, regarding Dan Brock:

1) *The choice of whether to procreate, with whom, and by what means*: reproductive freedoms contemplate the possibility of choosing whether or not to have offspring, with whom to have offspring, and by what methods; as well as actions intended to reproduce and actions intended to avoid reproduction. Reproductive freedoms may therefore include access to new reproductive techniques and genetic information to choose whether or not to reproduce, although the latter access may be justifiably limited because of the high cost that some reproductive services may entail.
2) *The choice of when to procreate*: The timing of a person's reproduction can have many complex and important impacts on their life. The advent of contraception makes the choice of when to procreate important to this form of freedom.
3) *The choice of how many offspring to have*: Reproductive freedom includes the choice of how many offspring to have. This aspect has been an important feature in debates about human cloning, which would make it possible to produce many identical individuals from the genetic material of a single individual. At the same time, this freedom could be limited under certain social conditions (the need to control population growth). Similarly, a distinction must be made between the desire to have offspring and the desire to be a parent. Brock points to two reasons for prioritizing the last desire over the simple desire to have a large number of offspring. First, the interest in the desire to have emotional connections and to experience parenthood. Second, having offspring involves financial expense not only to the parents, but also to outsiders, and the more expensive the outsiders incur, the more justified their claim to the cost imposed on them will be. Likewise, one implication of the distinction between the interest in becoming a parent and the interest in having many offspring is that preventing harm from the genetic transmission to others may more easily justify limiting the number of children than reproducing and rearing children.
4) *The choice of what kind of offspring to have*: One of the most controversial components of reproductive freedom is the freedom to choose what kind of child to have. This conflicts with genetic interventions to prevent harm to offspring. Such control takes on an important role for parents in determining whether there is a risk of transmission of a particular genetic disease. Parents can then use this information to make reproductive choices.
5) *The choice of whether or not to have a biological relationship with the child*: One aspect of the choice about what kind of child to have deserves special attention. When one or both parents are unable to reproduce by natural means, then even if adoption is an available alternative, they may choose to use a variety of means of artificially assisted reproduction, including human cloning itself, if it becomes possible in the

future, in order to have the experience of raising a child to whom they are biologically related. For many parents, the desire to have a biological child rather than an adopted one is very strong. Sometimes, due to a risk of genetic disease, the child must be an adopted child or one who is not biologically related to one of the parents.

6) *The social conditions underpinning reproductive choices*: According to Brock, reproductive freedom has to include the social conditions necessary to ensure individuals a range of reproductive choices without limits or unjust impacts from those choices. What is important here is that individuals' interest in reproduction includes an interest in the background social conditions necessary to have a good range of reproductive alternatives[242].

The importance of the reproductive freedoms scheme, according to Brock, lies in the following:

1) *Self-determination*: this is the interest of individuals in making important decisions in their own lives. People, according to Brock, have the capacity to value their own desires and motivations, and it is this capacity that enables human beings to have a conception of the good. Likewise, it is through this capacity for critical reflection that people are able to form, and act upon, a conception of their good. If they have the capacity to make choices in their lives as they wish for themselves, in the sense of not being interfered with because others disagree with those choices, then they are able to take some control and responsibility for their lives. Self-determination in reproductive freedoms includes religious freedom, as many reproductive choices are guided by religious beliefs.
2) *Individual good or well-being:* this point refers to the contribution that reproductive freedoms make to the well-being or good of individuals, which requires explaining and delimiting what we mean by "individual good". In philosophy, three main theories of the good of individuals are usually distinguished. Firstly, there are theories of conscious experience, which argue that the good consists of certain kinds of positive psychological states, often characterized as pleasure or the absence of pain or unhappiness. Secondly, there are preference or desire-satisfaction theories, which argue that people's good is the satisfaction of their desires or preferences. Finally, and thirdly, there are the objective good theories, which deny that a person's good consists only of the two theories seen above, and which maintain that some things are good for people even if they do not want them or derive pleasure or happiness from them.
3) *Equality of expectations and opportunities:* this last point refers to the moral principle of equality, being important to clarify the two points seen above. In this context, one of the main keys to equal expectations and opportunities is gender equality, this is, whether someone is a man or a woman should be irrelevant, and therefore, this fact should not morally affect the expectations of social and economic life and the opportunities to achieve desired positions and their benefits. This premise is not an attempt to deny the differences between men and women but to construct a legal, fair, and necessary balance between the two, since the inequalities suffered by women are

[242] Buchanan, et al. (2000) *From chance to choice*. pp: 209-212.

forms of gender discrimination that place them at a disadvantage. Similarly, there are also situations where sex differences, such as the fact that only women can become pregnant, can lead to social and economic disadvantages. Finally, reproductive freedoms serve equality in two ways: they help to mitigate unfair gender disadvantages suffered by women, especially those linked to reproduction; and they can help to alleviate the effects of other forms of gender discrimination against women not linked to reproduction[243] .

4.5. What can we rescue?

Throughout this chapter, we have seen different proposals for fair equality of opportunity, different models of health, the role that parents and bioengineers can play, and reproductive freedoms. In the following pages, we will discuss what we can take away from what has been argued and what should be criticized.

4.5.1. Who is unqualified?

Earlier we saw that both Buchanan and Daniels positioned themselves as advocates of the first form of *Level Playing Field Conception,* this is, the social structural view. In other words, they, like Rawls, consider that the unjust social structures of a state must be eliminated in order to make way for equality of opportunity that allows jobs to be filled by people who have the capacity to exercise such functions, regardless of their sex, race, sexual orientation, etc., and although the social structural view does not focus on the inequalities produced by nature as much as the raw luck view does, Buchanan and Daniels seek to circumvent support for the brute luck view through the use of enhancement technologies, this is, they seek a state which makes voluntary use of enhancement technologies to facilitate new individuals being born without disease or disability so that they can compete with others on equal terms in the labor market.

Certainly, a job cannot be filled by someone who does not possess sufficient capacity for it, either for social reasons or for natural reasons, such as illness or disability. A blind person cannot be a taxi driver unless he or she is assisted by a tool or a method that hides his or her blindness. The question is: what and how important is, or should an illness or disability be, in competing in the labor market?

As Roemer points out, what is important in a disease or disability is not whether it can be called a disease or disability, but whether it reduces the individual's life chances. Thus, if a citizen has a genetic disease that does not diminish his or her capabilities for the job he or she wants, then such a disease should not be relevant to his or her access to the labor market.

However, the defense of the social structural vision, supported by the enhancement technologies, seems more reasonable than the defense of the vision of raw luck, because the

[243] Buchanan, et al. (2000) *From chance to choice.* pp: 214-222.

leveling of equal opportunities must be done for the better and not for the worse, this is, we must strive for people and future individuals with handicaps to have a range of life chances as big as the range of life changes that individuals without handicaps, and not the other way around. However, the focus of a social structural vision, I believe, should not be on who has a disease or disability and who does not, but on who has the necessary skills to compete on equal terms in the labor market and who does not. Moreover, who has the authority to determine that an individual in a given society is an unfit person?

Earlier we saw that Buchanan and Daniels point out that the characteristics of the people who cooperate in a society can make a difference as to what is considered a disability and what is not. This, in turn, may affect those who are not able to compete in the labor market. However, do the characteristics of individuals determine who is and who is not qualified for a job? If not, then what determines whether an individual is unable to compete equally in the labor market?

An individual may be unfit to compete for a variety of reasons, from social to natural. But it is not society itself that determines the unfit for work, but what shapes that society, from individuals of the past to ideals, inventions, and discoveries. The society of the present is only a product, a consequence of what formed it. Therefore, if we create an artificial island to move individuals there to create our new eugenic liberal country, then, by forging it, among its constitution and laws, we will at the same time create a group of unfit laborers, a consequence of our legislative actions. When we create a state law we do not only declare what is in our opinion desirable for society: we also declare what is not desirable. Therefore, as founders of this new state, it is our duty to assist the labor untrained to compete on an equal footing with the trained, for the labor untrained are so primarily as a consequence of our actions.

4.5.2. The moral limits of health models. The danger of polarization and homogenization.

Buchanan, Daniels, Wikler, and Brock could not decide between the public health model and the personal service model. The public health model, although it is appealing, may not be feasible when it comes to including genetic services in the public sector. While the liberal eugenic state should prioritize the pursuit of equality of opportunity over economic savings, a full public health model could result in individuals having equal opportunities but few job opportunities. Factors such as genetic testing or genetic enhancement interventions may involve excessive public cost, as we saw above.

However, the threats surrounding the personal service model can be very great. By leaving genetic interventions in the hands of individuals as if they were a consumer good, we risk creating two dangers that Agar defines as the dangers of polarization and homogenization.

Firstly, the danger of polarization is that, because of unequal access to the enhancement technologies, society ends up being divided into two classes, one formed by genetically modified individuals and one formed by unmodified individuals. Secondly, the danger of

homogenization is the opposite of polarization, this is, that individuals in a society, because of the continued use of enhancement technologies, end up being all the same and looking too much like each other, physically and psychologically[244].

While these two threats are opposites, Agar points out that it is possible for both to occur in the same society at the same time. In other words, the same society can suffer from polarization due to unequal access to enhancement technologies and, at the same time, among the individuals who have access to them, due to the use they make of them, homogenization can occur, reducing, therefore, the diversity that makes up the human species[245].

The personal service model, therefore, can be very dangerous, but the public health model seems too utopian and unfeasible, which leads us to promote a mixed health model, as advocated by Buchanan, Brock, Wikler, and Daniels. This model should aspire to the public health model as far as possible, and rely on visions analogous to the personal service model which the public health model does not reach. For this, as seen in the previous section, it will be necessary to rely on the social structural vision as a mode of *Level Playing Field* and to promote human diversity as a useful value for the advancement of society and its individuals.

4.5.3. Genetic internationalism

As we saw earlier, Fox pointed out the value of natural primary goods. Such goods can be useful in limiting the role of bioengineers and parents when genetic modification is carried out.

When parents raise their offspring, they project onto them the values they defend, their conception of the good, and their idea of what is a desirable future. However, these values may not be defended in the future by such offspring. Therefore, as discussed above, Daniels and Brock insist that genetic modifications should be directed not at the interests of the parents, but at the possible interests of their offspring. Likewise, these modifications should focus on traits that are useful for any life plan, this is, immunity to disease, increased immunity to injury, etc.

However, in addition to the need for what Fox claims, it is also necessary to defend genetic internationalism, this is, to defend the fact that the traits to be promoted with the enhancement technologies should not only be traits that offer an open future professionally, but also socially. In other words, the traits we seek genetically must be useful for any type of environment or, failing that, for as many environments as possible.

The role of bioengineers should be analogous to the role of parents in the nurturing of their offspring. When parents modify the environment for reasons of child nurturing, this modification and nurturing must be designed to ensure that the offspring have the future they desire, both professionally and socially. Therefore, the bioengineer has the duty to allow the

[244] Agar, Nicholas (2004) *Liberal Eugenics*. p: 142.
[245] Ibid. p: 143

future parents only those modifications aimed at giving the future sons and daughters a broad professional and social future.

However, sometimes we may be faced with modifications that provide competitive advantages, such as height, that may end up being counterproductive because everyone chooses them for their offspring, as noted above. In this case, genetic modification can be marked as ethical or unethical not based on whether it is a competitive advantage or not, but whether it represents a primary natural good and is valuable for all types of human environments. Height modification may be useful in professions such as basketball, but may also be of little relevance to other professions, such as teaching.

Another drawback to the defense of genetic internationalism is the test of time. International values may change over time, so genetic modification in the present may not be useful in the future. Similarly, future labor pathways may differ from the present. This leads to the view that the defense of genetic internationalism requires timelessness, this is to defend traits whose importance and usefulness are not only as universal as possible but also not limited by a particular era. For example, being immune to a virus such as COVID-19 may be of greater or lesser importance depending on the context or the era, but it will not cease to be useful no matter how many years go by.

4.5.4. Limits on reproductive freedoms

One of the strong points defended for the creation of a liberal eugenic state has been the defense of reproductive freedoms, which are necessary not only for procreative freedom but also for sexual freedom. In this framework, it is necessary to consider the pertinence of a series of limitations to these freedoms in order to protect the autonomy of the newborn and to avoid falling into dishonest situations.

Limitation on cloning

We saw earlier that Dan Brock highlights the importance that cloning can have when the parents decide, whether or not to have a biological relationship with the offspring. Similarly, Agar, in his article "Cloning and Identity", published in 2003, is in favor of human cloning, arguing that raising a clone may be easier than raising a naturally produced offspring because, thanks to genetic similarity, it is easier to transmit psychological traits, as well as to find an ideal environment for the transmission of these psychological traits[246].

However, reproductive cloning and the use of techniques such as *Somatic Cell Nuclear Transfer* in humans may run counter to genetic pluralism and undermine the biological diversity that makes up our species. The third chapter of this thesis looked at various enhancement technologies that can modify the genetics of new offspring. But cloning differs from the others in that it creates a genetic copy of an existing individual to give rise to another

[246] Agar, Nicholas (2003) "Cloning and Identity", *Journal of Medicine and Philosophy,* Vol. 28, pp: 9-26.

individual with the same genetic load. This may end up becoming a threat of social homogenization and cause difficulties for the survival of the species in the face of biological adversity, such as the Coronavirus pandemic.

However, reproductive cloning can have an ethical use if its purpose is to save endangered animal species, as we saw with the Viagen Pets company when it decided to clone Przewalski horses in order to prevent their disappearance. Therefore, the use of *Somatic Cell Nuclear Transfer* for reproductive purposes should be limited to survival purposes. Similarly, this cloning technique is also ethical if the purpose is therapeutic cloning, as in this instance it does not create new individuals, but new organs or tissues with the same DNA as a patient for the purpose of transplantation, thus saving the need for a donor.

Sex selection

One of the most controversial features noted above about reproductive freedoms is the choice of what kind of offspring to have. Sometimes this may refer to the selection of the sex of the future individual in order to avoid genetic diseases[247]. Other reasons for this selection, beyond therapeutic motives, may be religious, economic, or even social.

Such selection can lead to a number of moral and social problems. Firstly, allowing sex selection in a fetus may lead to an imbalance in the number of males and females in a country or region. Secondly, sex selection may inadvertently encourage sex or gender discrimination, and if all parents desire a particular sex for their offspring, then sex selection may become akin to a competitive advantage that will eventually become counterproductive.

Some parents, however, may desire a particular sex for other reasons: if they have only girls, then they may be interested in having a boy in order to have a different parental experience[248]. However, accepting this motive for sex selection would run counter to prioritizing the possible interests of the future offspring over the wishes of the parents in genetic modifications.

Possessing a particular sex, unlike immunity to disease, is not a primary natural good because neither being male nor being female is something we all desire. Therefore, the use of genetic modifications for this purpose should be limited, as should reproductive cloning, only to avoid the disappearance of animal species. On the other hand, allowing sex selection for therapeutic reasons is a rather complicated ethical choice without a clear solution, and it is more appropriate, in such cases, to make use of the right to abort[249] because of abnormalities in the embryo or fetus.

[247] Buchanan et al. (2000) *From chance to choice.* p: 182
[248] Ibid. p: 184
[249] Sometimes, as Brock points out, abortion has even been used as a method of sex selection (see page 183 of *From chance to choice).* An example of this is India, where after ultrasound scans many parents decide to abort if the sex of the fetus is female. This sometimes results in a considerable difference in the number of males and females, depending on the area. While this is a misuse of abortion, banning abortion for avoiding sex selection

5. CRITICS AGAINST LIBERAL EUGENICS

After having explored liberal eugenics in the social and political context, and how genetic engineering could be used for a liberal eugenic purpose in a state, this part of the thesis will address the criticisms that various authors have raised against this way of thinking.

This chapter will focus mainly on three authors who at the beginning of the 21st century questioned this mode of bioethical thinking: Jürgen Habermas, Francis Fukuyama, and Michael Sandel. Lately, more recent critics will be analyzed.

5.1. Jürgen Habermas's criticisms

Among the main opponents of liberal eugenics that can be found today is the German philosopher Jürgen Habermas. Born in Gummersbach, Germany, on 18 June 1929, he is one of the leading contemporary philosophers of the so-called Frankfurt School. He was a student of the philosophers of the first generation of this school, such as Theodor Adorno and Max Horkheimer, and a teacher of thinkers of the third generation, such as Axel Honneth.

5.1.1. Post-metaphysics. *Körper* and *Leib*

In his work *The Future of Human Nature,* published in 2001, Habermas, in order to criticize liberal eugenics, makes use of the concept of *postmetaphysics*. This concept could be understood as the idea that political and philosophical theory should be concerned with questions about real justice, rather than focusing on debates about whether there is another world or not[250]. In other words, while the study of metaphysics focuses on what goes beyond the physical, raising questions about human existence and death, postmetaphysics is oriented towards the intraphysical, this is, towards what is given in reality.

Habermas fixes the notion of postmetaphysics on human corporeality, especially on the formation of the idea of "I" by the new individual and on how he or she can come to "be himself or herself". In the same way, he considers that in order to achieve this "being itself", communicative action is important, this is, communication with peers, which is necessary for the self-understanding of "I".

In Habermas's postmetaphysics it is important to highlight the distinction between the concepts of *Körper* and *Leib. Körper'*s concept refers to the idea that "we have a body", while

would be too coercive. Therefore, the solution to prevent this use of abortion is through education and teaching, despite the obstacles it may present.

[250] N. Tampio, "Metaphysics and Postmetaphysics" [online] *Semantic Scholar,* 2015 https://www.semanticscholar.org/paper/Metaphysics-and-Postmetaphysics-Tampio/0a74a5855c0dea78aadbf133acafb0418bfd5333 [Accessed 30 June 2022].

*Leib'*s concept refers to the idea that "we are a body"[251]. In other words, on the one hand, *Körper* refers to the physical body that is given to us in our existence, while *Leib* designates "body" insofar as we are a subject, this is, an individual.

Habermas argues that when we are born, even if we are not aware of it, we possess a physical body, that is, we have ***Körper*.** When we begin to live we are an existence that possesses a body, a body that we possess even if it is something unknown to us. This body is a mystery to the new individual, for he does not know what it is like, what it can do, and how it can affect the outside. It is therefore necessary for the new subject to begin a process of studying and getting to know his or her own body. This process, at the same time, implies that the subject is also getting to know himself.

Gradually, as it develops and reaches its youth, the body reveals itself to the subject as it is. When this happens, the subject begins to understand it and, consequently, to manage it better. But for this process the subject also needs to create relations with other subjects; there must be "communicative action", which is, according to Habermas, a symbolically mediated interaction, which is oriented in accordance with intersubjectively valid norms that define reciprocal expectations of behavior and which have to be understood and recognized by two agent subjects[252]. Moreover, in these relations between the subject and the others, there must be mutual respect and symmetry, this is, a kind of principle of equality between them. In other words, the new subjects must establish, for their own development, relations with others in which there is reciprocity on both sides. In this way, they will learn and understand the environment in which they find themselves, the other subjects, and also themselves and their own bodies.

Habermas argues that it is through this procedure, through our knowledge and understanding of the world around us, through our self-understanding as the subjects and bodies that we are, and through our relations with the environment and other individuals, that the new subject will achieve its own individuality and autonomy to "be itself": in this way, it will be *Leib.*

With these two concepts, therefore, the author underlines that there is an important difference between what it means to have a body and to possess a body. An individual only possesses his physical, material body (*Körper*) if during the course of his life he "is" the body he possesses (*Leib*). Possessing the *Körper* is the result of the ability to objectively contemplate the process of *Leib*[253]. This aptitude is acquired during one's youth.[254]

[251] Habermas, Jürgen (2001) *El futuro de la naturaleza humana: Hacia una eugenesia liberal?* (trans.) Rosa Carbó, Spain, Paidós, p. 24.
[252] Habermas, Jürgen (1968) *Ciencia y tecnología como ideología* (transl.) Manuel Jiménez and Manuel Garrido, Spain, Técnos, 1968, p. 68.
[253] The concept of *Leib* (we are body) can be understood in different ways. It can be understood as the body as the subject or organism that we are. But also as *Leibkörper*, this is, as the physical and material body that we have; we possess it and we are it.
[254] Habermas, Jürgen (2001) *El futuro de la naturaleza humana.* p. 72.

It is this process that enables an individual to achieve the ability to "be itself". Thanks to it subjects possess autonomy, individuality, and are capable of self-criticism, as well as their own personal history and individual development.

5.1.2. The integrity of the person in Habermas

We can subject our own history to a self-critical review. Our biography is made of something we can call "our own", and we must assume it responsibly. But, for Habermas, this can change with the new technologies[255]. Likewise, once parents see the genetic endowment of their offspring as a product that can be molded at will, they could exercise over them a form of disposition that would affect the principles of their self-relation and ethical freedom. In the same way, these subjects, once they are aware that they have been subjected to genetic modification, can reason about it and reject this action, calling their parents and the bioengineers involved in it to account, and making them responsible for the consequences of this action.

What Habermas claims about the problematic of genetic modification is that the difference between the notion of "object" and the notion of "subject" is becoming increasingly blurred. At the same time, the reciprocity of our relationships is lost. When one person makes an irreversible decision regarding the nature of another, a new unknown interpersonal relationship arises. A relationship without symmetry, because this irreversible decision affects the body, restricting in this way the symmetry of responsibility that exists between free and equal persons[256].

As it was mentioned above, when a child grows up, he or she can look critically at his or her life and take responsibility for his or her biography. But this self-critical ownership does not occur in the same way if the child has undergone genetic manipulation. Thus, this new person is totally dependent on the unreviewable decision of other individuals and does not have the opportunity to produce the necessary symmetry for peer-to-peer treatment, following the retroactive paths of ethical self-reflection. Faced with the dissatisfaction of his or her fate, the new individual would have only two options left: fatalism or resentment[257].

For this reason, in Habermas's view, it is necessary to revise the Charter of Fundamental Rights of the European Union proclaimed in Nice in 2000. Article 3 of this charter says the following:

> Right to the integrity of the person
>
> 1) Everyone has the right to physical and mental integrity.
> 2) In the field of medicine and biology, they shall be respected in particular:
>   - The free and informed consent of the person concerned, in accordance with the modalities established by law,

[255] Habermas, Jürgen (2001) *El futuro de la naturaleza humana.* p: 25
[256] Ibid. p: 26
[257] Ibid. pp: 26-27

- The prohibition of eugenic practices, in particular those aimed at the selection of persons,
- The prohibition of the human body or parts of it as such being turned into an object of profit,
- A ban on the reproductive cloning of human beings[258].

5.1.3. Consequences of genetic engineering in Habermas

Habermas argues that, as a result of genetic engineering, being oneself with the own body (*Leib*) is subordinated to the body that we have (*Körper*), drastically diminishing our individuality and autonomy (genetic modification becomes the modification of our integrity). Why, according to Habermas, would the new modified individual not get used to his body and just respond to the critics of liberal eugenics with a simple "so what"? Because the genetically modified individual, he argues, has to live with the awareness that his hereditary traits have been manipulated with the intention of deliberately influencing his phenotypic makeup. As we have seen, Habermas considers that individualization is effected in a socializing medium in which there is compact linguistic communication, so the integrity of individuals is especially dependent on their careful treatment of each other[259]. This is how he understands the following two formulations by the German philosopher Immanuel Kant of the principle of morality in connection with the categorical imperative:

1) Firstly, we have the "finalist formula" of the categorical imperative, which urges us to contemplate any person "always at the same time as an end in himself" and never to use him "merely as a means". The categorical imperative demands of everyone for approaching the other as a second person with the intention of understanding him or her with respect to something in the world, rather than objectifying and instrumentalizing him or her with a view to one's own goals from the perspective of a third-person observer. This suggests, at the same time, that the categorical imperative requires everyone to abandon the first-person perspective in favor of an intersubjectively shared "we-perspective" from which we can all in common orient ourselves towards generalizable values.
2) Secondly, we have the "legal formula" of the categorical imperative. According to Habermas, the finalist formula builds a bridge to the legal formula, because the idea that norms, in order to be valid, must be able to find general assent, is insinuated in the remarkable determination of treating each person as an end in himself and thus to respect in him "the humanity"; this is: "Act in such a way that, both in your own person and in the person of all others, you never use humanity merely as a means but as an end". It is to the possibility of a normative understanding in the case of conflict that the legal formula of the categorical imperative refers to, which calls for binding one's own will precisely to those maxims which one could want as a general law. It

[258] (2000) "Carta de los Derechos Fundamentales de la Unión Europea". *Diario Oficial de las Comunidades Europeas,* [online] https://www.europarl.europa.eu/charter/pdf/text_es.pdf [Consultado el 14 de diciembre de 2022]
[259] Habermas, Jürgen (2001) *El futuro de la naturaleza humana.* p: 77

> follows that whenever there is disagreement about basic value orientations, autonomously acting subjects must engage discourses in order to discover or develop together those norms which, in a matter in need of regulation, merit the informed assent of all[260].

These two formulations clarify the same intuition in different aspects. On the one hand, it is about the "condition of end itself" of the person who, as an individual, must be able to lead an irreplaceable life of his or her own, and on the other hand, about the equal respect that corresponds to each person in its quality of being a person. In other words, Habermas argues that if we understand ourselves as moral persons, we intuitively start from the fact that, as irreplaceable persons, we act and judge "*in propria* persona", that there will be no other voice than our own[261]. This is what is meant by "being able to be oneself", and it is in the face of this "being able to be oneself" that the "alien intention" that is introduced into our biography by means of genetic engineering can be a disturbing factor.

In order for the subject to achieve this "being itself", and to be united with its own body (*Leib*), it is necessary for it to see its own body as a safe place, as if it were a house. For this to happen, Habermas claims that it is necessary for the subject to experience its body as something natural, this is, as the continuation of the organic, self-regenerating life from which the person was born[262].

Added to this is the naturalness of birth, which also plays a conceptually required role in such an unavailable beginning. For the concept of birth, Habermas quotes Hannah Arendt, for whom "the new beginning inherent in birth makes itself felt in the world only because the newcomer possesses the capacity to begin something new, this is, to act. Inherent in all human activities is an element of action in the sense of initiative - seating an initium - which means that it is precisely those beings who come into the world by birth and are subject to the condition of birth who carry out these activities[263] "[264].

Habermas says that what Arendt is trying to argue to mean is that, with birth, a difference starts between destiny by socialization of a person and destiny by nature of an organism. Thus, the person can only be seen as the author of imputable actions and the source of authentic claims if he or she assumes the continuity of a "being itself" that feels identical to himself or herself throughout his or her biography. Thus, a person whose destiny is exclusively the product of his socialization, a destiny that is determinant and only suffered, would have his "being itself" slip through his fingers in the stream of constellations, references, and formatively effective revelations[265].

For Habermas, eugenic programming of desirable properties and dispositions raises moral objections if it fixes the future person concerned to a certain life plan if it specifically restricts

[260] Habermas, Jürgen (2001) *El futuro de la naturaleza humana.* pp: 77-79.
[261] Ibid. p: 80
[262] Ibid. p: 81
[263] Ibid. p: 82
[264] See also: Arendt, Hannah (1958) *La Condición Humana*. Trans. Gil, Ramón, Spain, Paidós. p: 23.
[265] Habermas, Jürgen (2001) *El futuro de la naturaleza humana.* p: 83

his or her freedom to choose a life of his or her own[266]. Similarly, what happens if the modified individual does not meet the expectations of the parents? This leaves us at a dead end. As long as one's own intentions cannot be harmonized with those of others, there will be "dissonant cases" in genetic modifications. This is why he believes that eugenic interventions for perfection undermine the ethical freedom of the individual insofar as they fix him to external intentions, which he could reject in the future, but which, because they are irreversible, prevent him from understanding himself spontaneously as the undivided author of his own life. With this irreparable decision taken by third parties on their genome, a type of relationship arises that questions the hitherto obvious assumption of moral self-understanding in people who act and judge autonomously[267].

The conviction that all individuals assume the same normative status and owe each other reciprocal-symmetrical recognition is, for Habermas, based on a fundamental reversibility of the relations between human beings. No one can be dependent on another in a way that cannot in principle be reversed. But with genetic programming a relationship arises that is asymmetrical in several aspects. Unlike the relationship between parents and children, which dissolves in the generational handover when they become adults, the genealogical dependence of children on parents cannot be reversed. Parents beget their offspring, not the other way around. But this dependence concerns only the existence of the offspring, and not their mode of being. The genetic dependence of the programmed one regarding its designer, the eugenic praxis, both actions and non-actions, are the basis of a social relationship that goes beyond the usual "reciprocity between equals".

The irreversibility of the consequences of unilaterally carried out genetic manipulations means, according to Habermas, a problematic responsibility for those who see themselves as capable of such a decision. Eugenic programming would thus perpetuate a dependency between people who know that it is excluded as a matter of principle for them to exchange their respective social places. A dependency that cannot be intervened[268] .

5.1.4. Conclusions on Habermas: liberal eugenics as an attack against human futures

We have seen that for this author liberal eugenics, as well as genetic engineering interventions, are an attack against the identity and autonomy of future human individuals because they disrupt the natural presupposition of the consciousness of the person concerned to be able to act autonomously and responsibly.

The latter leads Habermas to the following two conclusions:

1) Genetically programmed people will no longer see themselves as the undivided authors of their own biography.

[266] Habermas, Jürgen (2001) *El futuro de la naturaleza humana.* p: 84
[267] Ibid. p: 87
[268] Ibid. p: 89

2) These people will no longer see themselves as persons of equal status, not limited in their relationship to previous generations[269].

Therefore, the first human being who fixes the "being so" of another at will would also have to destroy those freedoms which, being the same for all equals, ensure their diversity[270].

5.2. Francis Fukuyama's criticisms

Another opponent of the enhancement technologies, bioengineering, and liberal eugenics more generally, is the American neo-conservative political scientist Francis Fukuyama.

5.2.1. Fukuyama and the worry about biotechnology

The field of bioengineering and the enhancement technologies mentioned in the third chapter of this thesis (cloning, PGD, CRISPR, and artificial wombs) is an innovative field of study that promises many benefits for humanity. If this is so, why does Fukuyama point out that we need to worry about biotechnology?

The eugenic state policies mentioned in the first chapter of this thesis faced, according to Fukuyama, two objections. The first was that eugenic programs might not achieve their intended goals given the technology available at the time. The second was that such policies were too coercive, sometimes going to extremes, as the Nazis did[271].

However, these two objections do not apply to liberal eugenics and biotechnology. The measures proposed by the advocates of the new eugenics are not coercive, unlike the eugenic policies of the past, and they also have the innovations of the 21st century. He suggests that perhaps in the future reproductive technologies will be so safe and effective that no embryo will be discarded or harmed[272]. [273]

But if this is so, what objections can we raise against biotechnology, and why oppose it when it does not involve coercive or unsafe measures and generates hope for a better future? Fukuyama points to three objections that we will outline in the following sections: religious, utilitarian, and philosophical.

[269] Habermas, Jürgen (2001) *El futuro de la naturaleza humana.* p: 105
[270] Ibid. p: 146
[271] Fukuyama, Francis (2002) *Our Posthuman Future: Consequences of the Biotechnology Revolution,* United States, Farrar, Straus and Giroux pp: 85-86.
[272] Ibid. p: 87
[273] It is noteworthy that, when talking about liberal eugenics, biotechnology and reproductive technologies such as cloning, Fukuyama does not use the term "eugenics". Instead, he considers that it would be more appropriate to use the English concept of "breeding", which was Darwin's word for "selection", because this concept, unlike "eugenics", does not have a connotation of state sponsorship, but is appropriately suggestive of genetic engineering with dehumanizing potential.

5.2.2. Religious objections

According to Fukuyama, religion provides the clearest basis for being against genetic engineering in humans. In religions such as Christianity, God has created human beings in his image and likeness. In this creationism there is an important distinction between humans and non-humans: only humans have the capacity for moral choice, free will, and faith, a capacity that gives them a higher moral status than other creations[274]. God would produce these outcomes through nature, so a violation of nature's rules through genetic engineering would at the same time be a violation of God's will.

Given this premise, it is not surprising that those who follow the Christian religion are opposed to a large number of biomedical technologies, such as in vitro fertilization, abortion, stem cell research, cloning, etc. With these technologies, the human being takes the place of God as the creator of life.

At first glance, it might seem that Christians are the most visible group opposed to enhancement technologies and that religion is the only basis for opposing them. However, Fukuyama finds the religious basis for opposing genetic engineering problematic for three reasons:

1) There are many reasons to be skeptical about the ethical and practical benefits of biotechnology that have nothing to do with religion, as we will see below.
2) Religion often intuits moral truths that are shared by non-religious people, who fail to understand that their own secular views on ethical issues are as much a matter of faith as those of religious believers.
3) The view that religion will necessarily give way to scientific rationalism with the progress of education and modernization is, in itself, very naïve and far removed from empirical reality[275].

Fukuyama believes that while religion provides the clearest grounds for opposing certain types of biotechnology, religious arguments will not be persuasive to many who do not accept the initial premises of religion. It is therefore necessary to examine other, more secular types of arguments.

5.2.3. Utilitarian Objections

By "utilitarian" Fukuyama is mainly referring to economic issues, this is, that future advances in biotechnology may lead to unanticipated costs or negative long-term consequences that may overshadow the benefits[276] .

Modern economics provides us with tools to analyze whether a technology will be good or bad from a utilitarian perspective. In a market economy, it is assumed that individuals will pursue their own interests in a rational manner, based on individual preferences. Individuals

[274] Fukuyama, Francis (2002) *Our Posthuman Future*. p: 88
[275] Ibid. pp: 89-90
[276] Ibid. p: 91

are free to do this as long as the pursuit of those preferences does not prevent other individuals from pursuing theirs.

But if it is assumed that the use of these new technologies becomes a matter of individual choice by parents rather than something coercive imposed by the state, is it possible that harm resulting from individual choices can nevertheless affect society as a whole? Fukuyama argues that, according to economic theory, social harms can occur in aggregate only if individual choices lead to what are called negative externalities, this is, costs that are borne by third parties not involved in the transaction. For example, a company may benefit from throwing toxic waste in a river, but it will harm other members of the community[277].

Can we expect, then, that with the new technologies, there will be circumstances in which individual choices may entail negative externalities and thus lead to harm to society as a whole? Fukuyama answers yes because children subjected to genetic modification without consent are a clear case of potentially harmed parties. Given this problem, he says, some liberal thinkers would argue that since the vast majority of parents would only want the best for their children, there is a kind of implicit consent on the part of the children, since they are the beneficiaries of increased intelligence or other desirable genetic characteristics. However, Fukuyama considers that, despite this, it is possible to think of several cases in which certain reproductive choices would seem advantageous to parents but would cause harm to their children[278].

Many parents, under the influence of political ideology, culture, or tradition, may wish to give their offspring certain personality characteristics whose benefits are unclear. In this situation, Fukuyama, like Habermas, considers that such offspring might rebel against such genetic modifications because genetic modification in future beings involves integrating the preferences of one generation into the next[279].

Negative externalities can also arise in projects that aim to improve life expectancy through genetic modification. Fukuyama believes that if given the choice between dying and prolonging our lives through gene therapy, most of us would choose the latter. But if a large number of people choose, for example, to prolong their lives by 30 years at the cost of 30% of their functionality, then society will be the one who has to pay the cost of keeping them alive.

With all this, this debate on prolonging human life via genetic modification suggests negative externalities that go beyond economic ones. The fact that older people do not die will harm new young people as they "move up the age hierarchy". While everyone wants to postpone death as long as possible, people as a whole may not enjoy living in a society where the average age is eighty or ninety, where sex and reproduction become activities performed by a small minority of the population, or where the natural cycle of birth, growth, maturity, and

[277] Fukuyama, Francis (2002) *Our Posthuman Future*. p: 93
[278] Ibid. p: 93
[279] Ibid. p: 94

death has been interrupted. Fukuyama even warns that in an extreme scenario, the postponement of death by many could lead to birth control limits[280].

5.2.3.1. Fukuyama and the defense of nature

In the context of utilitarian objections, Fukuyama argues that, in the face of genetic modifications, there are good reasons to defend the natural order of things. There are many aspects of human nature that many would like to change if they had the chance. However, making nature better than it is is not easy. Evolution may at first glance appear to be a blind process, but, in its view, evolution follows a relentless adaptive logic that makes organisms adapt to their environments[281].

For example, criticism of human behavior such as aggression and violence, which in the past led to conquests, bloody duels, etc., is accepted today. But there are evolutionary reasons for the existence of such attitudes. That is to say, the vast array of emotional and cognitive characteristics of humans that allow for an elaborate degree of social organization was created, not by the struggle against the natural environment, but rather by the fact that human groups have struggled with each other. Competitiveness and cooperation are balanced in a symbiotic relationship not only across time and evolution but across human societies and individuals. Thus, aggression and violence have had a reason to be in the past of the human species, and societies that do not face competition and aggression stagnate and fail to innovate. At the same time, individuals who are overconfident and inclined to cooperate become vulnerable to others who are more bellicose.

The same could be said of "the family". Since Plato, it has been understood among philosophers that the family is the greatest obstacle to the achievement of social justice. People tend to love their families and relatives disproportionately to their objective value. However, this propensity to love your offspring more also has a powerful adaptive logic. This love, especially the parental love for their offspring, is critical because they are the ones who devote the necessary resources, both material and emotional, to raise a child to adulthood[282].

Nature, as Fukuyama argues, runs its course continuously and constantly, and explains the physical and psychological characteristics that human beings possess. Therefore, he stresses, it is important to be skeptical of arguments that claim that as long as the individuals are those who make eugenic choices, and not the states, we need not worry about negative consequences.

[280] Fukuyama, Francis (2002) *Our Posthuman Future.* p: 96
[281] Ibid. p: 98
[282] Ibid. p: 99

5.2.3.2. Limitations on Utilitarian Objections

The goods and evils that utilitarians evaluate in their cost-benefit prognosis, Fukuyama points out, are tangible and direct, often reducible to money or some physically identifiable harm to the body. A utilitarian perspective has some difficulty in including moral imperatives, which tend to be seen as another kind of preference. For example, Gary Becker, an economist at the University of Chicago, points out that a crime is the result of a rational utilitarian calculus: if a crime had a great benefit it would be committed (one might think of killing one's child if that death would bring a great reward). But the fact that most people would not consider killing their children for a reward implies that, in effect, either they have infinite value, or that the obligation to do right by them is not really commensurate with other kinds of values. In other words, there are things we consider wrong, regardless of the benefits they may give[283].

At the same time, the fear that people critical of enhancement technologies express, Fukuyama argues, is not a utilitarian fear but one related to the fact that we may lose our human essence. In other words, there is a fear of losing some essential quality in us that has always pointed to our sense of who we are and where we are going, despite all the obvious changes that have occurred in the human condition throughout history[284].

In defense of nature, Fukuyama stresses that it is human nature itself, that nature which the advocates of enhancement technologies seek to modify, what actually gives us a moral sense, what provides us with the social skills to live in a community, and what serves as a basis for sophisticated philosophical discussions, whether about rights, justice or morality. This is, Fukuyama believes in so-called "natural rights", he considers that there is a connection between human nature and human rights even though sometimes this connection is not clear, that is to say, that there are rights that are conferred on us because of our human nature[285]. Therefore, what is at stake with enhancement technologies is not simply a utilitarian cost-benefit calculation, but the very basis of our human moral sense[286].

5.2.4. Philosophical objections

The philosophical objections, the most important for Fukuyama, are about the human essence as that thing which makes us what we are, and also about human dignity.

[283] Fukuyama, Francis (2002) *Our Posthuman Future*. p: 100
[284] Ibid. p: 101
[285] Ibid. p: 101
[286] Ibid. p: 102

5.2.4.1. The X factor

For this author, the human essence is an "X factor", the most basic meaning of what a human being is, a quality that confers on those who possess it a minimum of respect[287]. But what is this X-factor and where does it come from?

Factor X cannot be reduced to a single human quality, being this the quality of our reason our capacity for moral choice, language, sociability, emotions, or any other trait that has been regarded as the basis of the human essence. On the contrary, it is all these qualities, taken together, that create such a factor, and not simply the sum of them. Each member of the human species possesses a genetic endowment that enables him or her to become a complete human being, an endowment that distinguishes him or her in essence from other kinds of creatures. At the same time, none of the above-mentioned key qualities, which contribute to the construction of the X-factor, can exist in isolation from each other.

For example, human reason is not like a computer, for it is permeated by emotions, and it is these that facilitate its functioning. Even moral choice itself, although it cannot exist without reason, is also based on emotions such as pride, anger, shame, and sympathy[288].

5.2.4.2. What is to be protected?

Regarding the X factor and the debate on human dignity, Fukuyama's aim is to answer the question: what is it that we want to protect from future advances in biotechnology? What is to be protected, he answers, is the full range of our natural complexity against the attempts of human self-modification. Human rights are based on the unity and continuity of human nature, and thus to violate them would be undesirable[289].

If this is Fukuyama's aim, then another question that must be asked is: how and why would biotechnology seek to make us less complex? According to the political scientist, the answer lies in the constant pressure to reduce the ends of biomedicine to utilitarian ends, this is, in the attempt to reduce a complex diversity of natural ends and purposes to a few simple categories such as pain and pleasure, or autonomy.

Among all the traits and characteristics that make up the human being, Fukuyama warns that the human aspect most threatened by biotechnology is the spectrum of our emotions. With biotechnology, we will be tempted to consider that we understand what "good emotions" and "bad emotions" are, and that human nature, therefore, can be improved if we suppress the latter in order to make people less aggressive, more social, more obedient, and less fragile[290].

The utilitarian goal of eliminating suffering is in itself highly problematic. No one likes to feel pain or suffering. However, Fukuyama warns, the human qualities that are considered

[287] Fukuyama, Francis (2002) *Our Posthuman Future*. p: 149-150
[288] Ibid. p: 172
[289] Ibid. p: 172
[290] Ibid. p: 173

most admirable are related to the way people react to, confront, overcome, or succumb to pain, suffering, or death. Thus, in the absence of these "bad emotions", there would be no more sympathy, compassion, courage, heroism, solidarity, or character[291].

5.2.4.3. Who are the most threatened?

In the short term, what biotechnology can generate, Fukuyama assumes, will not be a major threat to human dignity in adult persons, but to those who lack the total conjunction of traits defined as characteristics of human specificity, given in factor X. The greatest risk, then, would be to the unborn, although he also adds infants, the terminally ill, the elderly or those with certain diseases, and the disabled.

This threat is clearly seen when, for example, issues such as therapeutic cloning or stem cell research are addressed. As we saw in the third chapter of this thesis, therapeutic cloning and stem cell research involve the deliberate destruction of embryos, and it even proceeds to the creation of embryos solely for the purpose of research and then destroying them. As Kass points out, therapeutic cloning is not therapeutic for the embryo[292].

However, in considering such threats, Fukuyama faces a dilemma: if the unborn are the most threatened group by biotechnology, what about abortion? Would abortion clash with the idea of "human dignity"?

To answer this dilemma, he begins by asking: what do the "natural rights", mentioned above, suggest about human dignity and the status of the unborn, the disabled, etc.? Although he considers that his question does not have a definitive answer, he argues that natural rights themselves allow sketching one.

At first sight, if there is a doctrine of natural rights in which human dignity is based on the fact that the human species possesses certain unique characteristics, then such a doctrine might allow for a gradation of rights depending on the degree to which individuals of the human species share them. To understand the latter, Fukuyama points out that, for example, a person suffering from Alzheimer's disease, because of the fact that he has lost his ability to reason as an adult, also loses that part of his dignity that allowed him to vote in democratic elections.

From this same natural rights perspective, one might agree that it is more reasonable to assign different rights to the unborn compared to babies and children. A baby may not yet be able to reason, but it possesses emotional elements of the human emotional range, this is, it can get angry, laugh, cry, etc., and more things that an embryo cannot do. Likewise, Fukuyama argues that it is the violation of the powerful natural bond between parents and their offspring that makes infanticide such a heinous crime. But the fact that we hold funerals after the death

[291] Fukuyama, Francis (2002) *Our Posthuman Future*. p: 173
[292] Ibid. p: 174

of a baby, and not after a miscarriage, makes manifest the naturalness of the distinction between embryos and babies that is being made[293].

However, if a doctrine of natural rights allows for such gradation, whether between embryos and babies, or between people with and without Alzheimer's, then, if one is not cautious, one risks creating a hierarchical society. In the face of this danger, Fukuyama argues that there are several reasons not to be too hierarchical in the allocation of political rights.

First, there is no consensus on a precise definition of the essential human traits that qualify someone to have rights. Second, it is very difficult to make an impartial judgment about the degree to which an individual possesses a given trait since such judgments are rarely made by someone who is disinterested. Most aristocracies, Fukuyama argues, have been conventional rather than natural: aristocrats assigned themselves rights that they claimed were natural but were in fact conventional[294].

Turning to embryos, an embryo may lack some of the human characteristics that a baby possesses, but it is also not simply a collection of cells or tissues because it has the potential to develop into a full human being. This implies that while an embryo may be assigned a lower moral status than an infant, the embryo itself has a higher moral status than other types of cells or tissues. Thus, Fukuyama considers it reasonable to question whether researchers should be free to create, clone, and destroy human embryos at will[295].

In the evolutionary process between the ancestors of Homo Sapiens Sapiens and this one, Fukuyama argues, there was a qualitative leap that transformed the pre-human precursors of language, reason, and emotion into a human whole that cannot be explained as a simple sum of its parts. The same is true of the leap from an embryo to a baby. What begins as a group of organic molecules comes to possess consciousness, reason, moral choice, and emotion in a mysterious way[296]. The latter suggests that we must place many limits on activities such as stem cell collection if we want to avoid the misuse of stem cells.

5.2.5. Conclusions on Fukuyama: what should we do about biotechnologies?

The great innovation that supposes biotechnologies creates loopholes in the laws of a state. For example, it is not clear that the embryo issue discussed in the previous section can be applied in the same way to embryos outside a womb or in an artificial womb. Therefore, Fukuyama warns, there is a need to move from thinking to acting.

The Human Genome Project[297] devoted 3% of its budget to the study of the ethical, social, and legal implications of genetic research. This can be seen as a concern on the part of

[293] Fukuyama, Francis (2002) *Our Posthuman Future.* p: 176.
[294] Ibid. p: 175
[295] Ibid. p: 176
[296] Ibid. p: 176
[297] The Human Genome Project (HGP) was an international scientific project initiated in 1990 and completed in 2003. It was carried out mainly by English-speaking countries such as the United States, the United Kingdom,

scientists about the ethical implications of their studies. In many debates about the enhancement technologies, such as cloning, artificial wombs, CRISPR, or PGD, professional bioethicists are often relied on for taking the most permissive positions on such issues. However, according to Fukuyama, many bioethicists simply want to justify what the scientific community wants to do. Therefore, if bioethicists will not tell society that an action cannot be done, who will?

We saw that Fukuyama's main concern with biotechnologies is centered on human embryos. In the previous section, he discussed therapeutic cloning and stem cell research through the creation and subsequent destruction of embryos. However, Fukuyama warns, in the not-too-distant future society will also be confronted with other biotechnological problems in which the focus will be on embryos. These future problems include the following:

1) PGD: this technology is key to creating "designer babies". Fukuyama sees it as dangerous because of the future possibility of embryo selection on the basis of sex, skin color, or sexual orientation, among other genetically identifiable characteristics.
2) Germ-line engineering: this technology would cause the same problems as PGD but in a more extreme form. PGD is limited to a number of embryos to be chosen based on the genetics of two parents, whereas germ-line engineering would expand the possibilities to include virtually any other genetic trait, if it can be successfully identified, including traits originating from other species.
3) Creation of chimeras: related to germ-line engineering is the creation of chimeras using human genes. On this point, Fukuyama notes that there are those, such as Geoffrey Borune, former director of the primate center at Emory University, who think it would be interesting to try to produce a cross between monkeys and humans[298].[299] He also mentions a biotech company, *Advanced Cell Technology*, which reported that it had successfully transferred human DNA into a cow's egg and made it develop into a blastocyst before it was destroyed.
4) Psychotropic drugs: In the future, or even now, societies will have to make decisions about the legality and scope of “neuro-drugs”. In the case of drugs that allow for memory enhancement or other cognitive abilities, decisions would have to be made about the desirability of their use and the way in which such drugs would be regulated[300].

Therefore, in the face of the present and future problems posed by biotechnology, Fukuyama stresses the need to find a good policy framework that demonstrates that the development of these technologies is not inevitable and that it is sometimes necessary to ban them. Thus, reproductive cloning should be banned because, he argues, it is a highly unnatural form of

New Zealand and Canada, among others. The aim was to sequence the base pairs of human DNA and identify the genes that make up the human genome, both in relation to their function and their physical sequence.

[298] It is worth noting that in 2021, Spanish scientists in China managed to create more than 100 chimeras between monkeys and humans, some of them even developing nineteen days outside the womb.

[299] For more information, see: Asede, Manuel (2021): "Científicos españoles crean en China 132 embriones con mezcla de mono y humano", [online] *El Pais* https://elpais.com/ciencia/2021-04-15/cientificos-espanoles-crean-en-china-132-embriones-con-mezcla-de-mono-y-humano.html [Accessed 28 January 2022].

[300] Fukuyama, Francis (2002) *Our Posthuman Future.* pp: 206-207.

reproduction that will establish equally unnatural relationships between parents and their children. This is because, he argues, in cloning the son or daughter is only related to one parent, who will at the same time be a twin for him or her, while the unrelated parent is expected to care for what is a younger version of his or her couple[301].

Cloning is thus a good starting point for establishing the possibility of political control over biotechnology as there is considerable international consensus opposing such procedures. However, this consensus does not seem to be present for other biotechnologies, such as PGD, whose use is already possible today to ensure the birth of children free of genetic diseases. Such technology may even have more controversial uses, such as sex selection.

How to draw the red lines in the face of this lack of consensus on some biotechnologies? Fukuyama answers that one obvious way to do this is with the therapy/enhancement distinction, directing research towards the former and placing restrictions on the latter, since the purpose of medicine is to cure sick people, not to turn healthy people into gods[302].

However, the therapy/improvement distinction, as we pointed out in the second chapter of this thesis, can be criticized and questioned. Philosophers such as Michel Foucault, Fukuyama points out, argue that what society considers a pathology or disease is in fact a socially constructed phenomenon in which deviation from some presumed norm is stigmatized. An example of this is homosexuality, which was considered a disease by the WHO until the end of the 20th century[303].

Yet, Fukuyama points out, the fact that the distinction between therapy and enhancement seems unclear does not make the distinction meaningless or make it impossible to establish certain guidelines. As Kass points out, there is a natural functioning of the whole organism that has been determined by the requirements of the evolutionary history of the species, and such functioning is not simply an arbitrary social construct. Building on Kass's assertion, Fukuyama believes that the only people who could say that there is no difference between sickness and health are those who have never been sick, and that if you have a virus or break a leg, then you know something is wrong[304].

Once the need for red lines has been established, the question that arises is to think about how the institutions that ensure their compliance should be. It is a difficult question to answer. Politics, in relation to biotechnology, does not unfold in places that may be familiar. Whether a politician from the US is a Democrat or a Republican does not imply that he or she is for or against biotechnologies. Some even prefer to avoid these issues. However, Fukuyama warns that if legislators in democratic societies do not confront this issue, other institutions will make the decisions for them.

Institutions and agencies that regulate biotechnology, he defends, should not only have a broad mandated power, but should also count on different people from other political

[301] Fukuyama, Francis (2002) *Our Posthuman Future*. p: 207
[302] Ibid. p: 208
[303] Ibid. p: 209.
[304] Ibid, p: 209

agencies, this is, scientists, physicians, but also other voices in society who are prepared to make judgments about the ethical and social implications of new technologies[305]. Furthermore, these new agencies should not only have the power to regulate biotechnology beyond efficacy and safety but should also have legal authority over all research and its development, not just federally funded research[306].

5.3. Michael Sandel's criticism

A third opponent of liberal eugenics is the American philosopher Michael Sandel. Born on 5 March 1953 in Minnesota, USA, Sandel studied at Balliol College, Brandeis University, and Palisades Charter High School, excelling in areas such as pedagogy and political philosophy. Among his prominent tutors were the Jewish-born philosopher and historian Isaiah Berlin, and the philosopher Elizabeth Anscombe. Sandel has taught at Harvard Law School and hosted the television program *Justice*, which raises a variety of ethical, political, and philosophical issues[307].

5.3.1. Sandel and the problem of genetic improvement

Like Fukuyama, Sandel focuses his criticism of biotechnologies on the problem of genetic enhancement, pointing out that, like cosmetic surgery, genetic enhancement uses medical means for non-medical purposes, this is, purposes unrelated to the cure or prevention of disease or harm. However, unlike cosmetic surgery, genetic enhancement goes beyond the "epidermal[308] ".

To address the ethics of improvement, Sandel points to the need to confront important questions that, from his point of view, have been lost from view, this is, questions about the moral status of nature and what is the proper stance for human beings to take towards this world that is given to us.

Today, the shadow of eugenics is still present in debates about bioengineering and genetic enhancement. Critics of such enhancements, Sandel points out, argue that human cloning, or seeking to "design boys and girls", is nothing more than a "privatized" or "free-market eugenics". On the other hand, advocates of genetic enhancements argue that genetic enhancements, freely undertaken, are not eugenics, at least in the pejorative sense of the term,

[305] Fukuyama, Francis (2002) *Our Posthuman Future*. p: 214
[306] Ibid. p: 215
[307] For more information, see the programme's website http://justiceharvard.org/justicecourse/
[308] Sandel, Michael (2004) "The Case Against Perfection" [online] *The Atlantic* https://www.theatlantic.com/magazine/archive/2004/04/the-case-against-perfection/302927/ [Accessed 3 February 2022].

and that removing the compulsion of eugenic policies means removing what made eugenic policies so repulsive[309].

So, when debating genetic enhancements and eugenics, what is the point of this debate? Is 20th-century eugenics only objectionable because it was coercive? Or is there something negative about even non-coercive ways of controlling the genetics of new generations? These are some of the questions that Sandel will try to answer.

5.3.2. Eugenics and the free market

One example of a non-coercive eugenic policy, Sandel argues, was in Singapore during the 1980s. Singapore's president, Lee Kuan Yev, was concerned that more educated Singaporean women were having fewer sons and daughters than less educated women. He feared that future generations would be left without talent. To prevent this, the government implemented policies to encourage university graduates to marry and have offspring. It created a dating service that was programmed by computed and administrated by the state, incentives for educated women to have offspring were given, among courtship classes at academies, and trips on the "love cruise" for unmarried college graduates. At the same time, less educated women were offered a $4,000 incentive to pay for a low-cost flat, only if they were willing to be sterilized[310].

These eugenic policies made the leap to the free market, as instead of using forced sterilization, citizens were paid for voluntary sterilization. Sandel argues that those who see ancient eugenics as abhorrent will feel the same way about these Singapore policies. The $4,000 incentive is a form of coercion, especially for poor women, and at the same time, the "love cruise" program is part of a collectivist agenda that sneaks into reproductive choices, about which people should be free to act on their own, unmonitored by the state[311]. However, Sandel argues, eugenics is wrong even when there is no coercive factor in it. There is something wrong with the ambition, whether individual or collective, to determine the genetic characteristics of our progeny through deliberate design.

If we focus on the egg and sperm market, artificial insemination allows future parents to buy gametes with the genetic traits they want for their offspring. It is a less predictable way of "designing" children than the techniques mentioned above, such as cloning or PGD, but it offers, according to Sandel, a good example of a procreative practice in which the old eugenics meets the new consumerism.

In 1999 there was an advertisement in some Ivy League college newspapers in the United States offering $50,000 for the egg of a young woman who was at least six feet tall, athletic,

[309] Sandel, Michael (2007) *The Case Against Perfection: Ethis in the Age of Genetic Engineering,* United States, The Belknap Press of Harvard University Press, p: 68.
[310] Ibid. p: 69
[311] Ibid. p: 70

with no major family medical problems, and an SAT score of 1400 or higher[312] [313]. What is wrong with this kind of market according to Sandel? No one is forced to buy or sell in the advertisement mentioned above, so its negative aspect is not linked to coercive motives.

Some, Sandel points out, might worry that the high prices could lead to the exploitation of poor women, who are faced with an offer they cannot refuse. However, the American philosopher argues that buying and selling the most expensive eggs is more likely to interest the rich than the poor, and if a market for "Premium Eggs" gives us moral qualms, then it means that the moral concerns involved in these eugenic issues go beyond freedom of expression. The story of two sperm banks can explain this situation.

On the one hand, there is the story of the "Repository for Germinal Choice", founded in 1980 by Robert Graham, a eugenic philanthropist whose aim was to improve human germplasm worldwide and "counteract the rise of retrograde humans". To achieve his goal, he planned to collect sperm from Nobel laureates and make it available to women seeking donors, in the hope of giving birth to gifted babies. However, Graham had trouble getting these Nobel laureates to donate sperm for his cause, and ended up settling for the sperm of promising young scientists. His sperm bank closed in 1999[314].

On the other hand, there is the history of the "California Cryobank", founded in 1977. It is one of the world's leading sperm banks and a for-profit but non-eugenic enterprise. Cappy Rothman, co-founder of this sperm bank, did not share Graham's eugenic goals, but the standards imposed by Cryobank on its donors were no less demanding than those imposed by Graham, because in Cryobank the ideal donor had to have a university degree, be 1.83 meters tall, has brown eyes and blond hair, among other features. These characteristics were not ideal because the company wanted them to be, but because they were the ones most in demand by clients[315].

Given these two stories, Sandel argues that anyone who is upset with the eugenic aspect of Graham's bank should also be upset with Cryobank, although in the latter the eugenic aspect falls more heavily on female consumers. After all, what is the difference between "designing" children according to a eugenic purpose and designing them according to what the market says? Whether the goal is to improve human germplasm or to cater to market preferences, both practices are eugenic in that both make children products of market design[316].

5.3.3. Sandel and liberal eugenics

Sandel claims that it is in this 21st century that the language of eugenics has made a comeback among those who defend genetic improvements. As we saw in the second chapter of this thesis, Nicholas Agar, the creator of the concept of "liberal eugenics", argues that one of the

[312] The SAT is a standardized test that is widely used for university admission in the United States.
[313] Sandel, Michael (2007) *The Case Against Perfection.* p: 72
[314] Ibid. p: 73
[315] Ibid. pp: 73-74
[316] Ibid. p: 74-75

main characteristics of this new eugenics is neutrality on the part of the state, this is, the government will not tell parents what kind of child to "design", and parents will only be able to modify those traits that improve their capabilities without truncating their possible life choices.

Other advocates of liberal eugenics, such as Allen Buchanan, Dan Brock, Norman Daniels, and Dan Wickler, believe that the bad reputation of eugenics is due to practices that might be avoidable in a future eugenics program. They argue that the problem with the old eugenics is that the burden fell too heavily on the weak and the poor, who were unjustly sterilized and discriminated. However, as we have already pointed out, as long as the benefits and burden of genetic improvement are fairly distributed, eugenic measures can be unobjectionable, and even be morally necessary.

Sandel highlights another advocate of liberal eugenics, Ronald Dworkin (1931-2013), a former American professor of philosophy of law at Oxford University. Dworkin believed that there is nothing wrong with making the lives of future humans longer and full of talents. He goes so far as to point out that if playing God involves struggling to improve our species, bringing to our conscious designs a resolve to improve what God has left deliberately, or what nature has so long blindly developed, then the first principle of ethical individualism mandates that struggle[317].[318]

He also alludes to liberals who defend liberal eugenics, such as Robert Nozick (1938-2002). The latter goes so far as to propose a "genetic supermarket" that would allow parents to order "designed children" without imposing a design on society. This market system, he argues, has the virtue of not involving a centralized decision on the type of human to be obtained[319].[320]

Even Rawls's political theory, as it was shown in the fourth chapter, offers some support for the defense of liberal eugenics. In his Theory of Justice he goes so far as to argue that the various parties to the social contract "want to secure for their offspring the best genetic legacy (assuming their own to be modified)", and that over time, society must take steps to preserve the general level of natural abilities and prevent the spread of serious defects[321].

For Sandel, liberal eugenics moves away from collective ambitions. It is thus not a social reform movement, but a way for privileged parents to have the offspring they want and prepare them for success in a competitive society[322]. Advocates of liberal eugenics see no moral difference between improving a child's intellectual capacities through education and doing so through genetic modification. All that matters from the liberal eugenic point of view is that neither education nor genetic alteration curtail or eliminate the future offspring's right to an open future. Thus, as long as the enhanced ability is a mean for “all intents and

[317] Sandel, Michael (2007) *The Case Against Perfection.* p: 76
[318] See also: Dworkin, Ronald (2000) *Sovereign and Virtue,* United Kingdom, Harvard University Press.
[319] Sandel, Michael (2007) *The Case Against Perfection.* p: 77
[320] See also: Nozick, Robert (1974) *Anarchy, State and Utopia,* United States, Blackwell Publishing.
[321] Rawls, John (1971) *A Theory of Justice, Revised Edition,* United States, Harvard University Press, p: 92.
[322] Sandel, Michael (2007) *The Case Against Perfection.* p: 78

purposes" and thus does not direct the child towards a particular career or life plan, it is morally permissible[323].

However, liberal eugenics is, for Sandel, not so liberal after all: since parents have a duty to promote the welfare of their children (while respecting their right to an open future) enhancements would become not only permissible but mandatory. Thus, just as the state can require children to attend school, it can require parents to use genetic technologies (as long as they are safe) to improve their IQs[324].

We saw earlier that Habermas, based on his post-metaphysical thinking, opposed liberal eugenics on the grounds that it violated the principles of autonomy and equality. It violates the principle of autonomy because genetically programmed persons cannot address themselves as "the sole authors of their own life and history", and the principle of equality because it destroys the essentiality of symmetrical relations between free and equal humans between generations.

Sandel agrees with Habermas in his opposition to liberal eugenics, but criticizes him for only being against liberal eugenics in liberal terms. In other words, liberal eugenicists can argue against Habermas that "engineered infants" are no less autonomous with respect to their genetic traits than those born naturally, because no one chooses their genetic inheritance. On this point, Sandel agrees with liberal eugenicists. As for the Habermasian concern for equality and reciprocity between generations, advocates of liberal eugenics may respond that this concern, while legitimate, does not apply only to genetic manipulation. For example, parents who force their children to play the piano are also exercising non-reciprocal control. The question for liberal eugenicists, therefore, is whether parental intervention, whether eugenic or environmental, undermines the freedom of the offspring to choose his or her own life plan. In other words, Sandel considers that an ethic based on autonomy and equality cannot explain what is wrong with liberal eugenics[325].

In his view, however, Habermas has a remarkable argument. The German philosopher claims that we experience our own freedom with reference to something that, by its very nature, is not at our disposal. That is to say, he considers that in order to think of ourselves as free entities we must be able to attribute our origins to "a beginning that eludes human disposition", and birth, because it is a natural event, encounters with the conceptual requirement of constituting a beginning that cannot be controlled[326].

Similarly, he rescues from Habermas the idea of a connection between the randomness of the beginning of a life that is not at our disposal, and the freedom to give to a life an ethical form. This connection, according to Sandel, explains why a genetically designed child is in debt and subordinated to another person (the designing parent) in a way that an offspring with an impersonal and contingent beginning is not. Moreover, the fact that our freedom is tied to a

[323] Sandel, Michael (2007) *The Case Against Perfection.* p: 78
[324] Ibid. p: 78-79
[325] Ibid. p: 81
[326] Ibid. p: 81

beginning we cannot control also leads to another greater consequence: whatever it is the effect on the child's autonomy, finishing with random and mastering the mystery of birth diminishes the designer parent and corrupts parenthood as a social practice governed by norms of unconditional love[327].

5.3.4. Conclusions in Michael Sandel: Eugenics as a triple moral problem.

Liberal eugenics, for Sandel, implies a triple moral problem to be faced: responsibility, humility, and solidarity.

First of all, it is a problem for humility because it will diminish inside us. Parenthood is a school for this. The fact that we care for our sons and daughters but cannot choose what kind of offspring we want makes parents open to the spontaneous and the unexpected, and thus a posture of humility is adopted. However, a world like the one depicted in Gattaca, where parents have become accustomed to choosing the genetic traits of their offspring, would be a world inhospitable to the spontaneous[328].

Secondly, it is a problem for responsibility because it will make us more responsible for our actions. In genetic modifications, we set aside chance and allow for choice. Thus, parents become responsible for choosing, or not choosing, the right traits for their offspring. The fact that one can observe oneself as a creature of nature or of fortune is a blessing because we are not entirely responsible for what we are. But the more our genetic heritage is mastered, the more responsibility we have for our own talents. So if in the present a basketball coach can blame a player for missing a shot, perhaps in the future he can blame him for being short[329].

Thirdly, it is a problem for solidarity, especially in countries like the United States, where there is no universal health care like in Spain, but a compendium of insurance companies. The US health insurance market mimics human solidarity in that people do not know or control their own health risk factors. But what if genetic testing in the United States were to advance to the point where it was possible to predict one's medical future and life expectancy? If this were to happen, says Sandel, there would be no more solidarity on the part of insurers, because they would be able to use the genetic data of customers and assess whether or not they are worth insuring. Similarly, genetic enhancements could make it difficult to foster the moral sentiments that social solidarity requires[330].

Finally, Sandel concludes that it is plausible to see genetic engineering, and also liberal eugenics, as the ultimate expression of our determination to see ourselves as the masters of the world, the masters of our nature. But for him, that promise is flawed, and it threats with

[327] Sandel, Michael (2007) *The Case Against Perfection,* p: 82-83
[328] Sandel, Michael (2004) "The Case Against Perfection".
[329] Ibid.
[330] Ibid.

making our appreciation of life as a gift disappear, and leaving us with nothing to affirm or contemplate outside our own will[331].

5.4. Current criticisms

In recent years, critiques of liberal eugenics have also been made from new approaches. This section will focus on two authors: Catalina Devandas, a Costa Rican lawyer who served as the "United Nations Special Rapporteur on the Rights of Persons with Disabilities" from 2014 to 2020; and Donovan Tateshi Miyasaki, a researcher, and lecturer in philosophy at Wright State University in Ohio, USA.

In December 2019, Devandas published in the Human Rights Council the text entitled: "Right of persons with disabilities: Report of the Special Rapporteur on the rights of persons with disabilities", in which he criticizes liberal eugenics from a perspective focused on the rights of persons with disabilities and the way in which Agar's philosophy could affect them. On the other hand, in September 2021, Miyasaki published the article "A Nietzschean critique of liberal eugenics", in which he develops a critique of liberal eugenics based on Nietzsche's philosophy and the intentions behind those who support this ideology.

5.4.1. Devandas and the issue of disability in the field of bioethics

Disability rights activists and bioethicists often have conflicting goals. For bioethicists, preventing or curing disease is a moral issue, and this would include disability. However, from the activists' perspective, disability is part of the continuum of human experience. Thus, the bioethical question that concerns Devandas is not about whether to prevent or cure disabilities, but about ensuring that all persons with disabilities enjoy the same rights and opportunities as others.

One of the major concerns of those who seek to protect the rights of disabled people is precisely liberal eugenics. It is true that this eugenics is not coercive, but in a context of discrimination and prejudice towards people with disabilities, the aggregate effect of many individual reproductive choices is likely to produce eugenic outcomes. Market and enabling pressures, according to Devandas, make it imperative to have the "best possible child" with the best possible life chances[332]. Some utilitarian bioethicists, have argued that genetic enhancement is a moral obligation and that it is ethical to give parents the choice to euthanize their newborns with disabilities[333].[334]

[331] Sandel, Michael (2004) "The Case Against Perfection".
[332] Devandas, Catalina (2020) "Rights of persons with disabilities: Report of the Special Rapporteur on the rights of persons with disabilities", *General Assembly.*
[333] Savulescu, Julian (2001) "Procreative Beneficence: Why we should Select the Best Children" Bioethics, 15, pp: 414-426
[334] See also: Singer, Peter (1993) *Practical Ethics.* United States, Cambridge University Press, 2nd. ed.

There is thus a concern that the practices of this new eugenics will not only increase but also result in a general decline in social acceptance and solidarity in relation to diversity and difference. When bioethics addresses the moral permissibility of using a particular medical or biological intervention to prevent or treat disability, it is also judging the quality of life and ultimately the value of persons with disabilities.

An added concern is the degree of reliance on such medical practices and policy-making by bioethics committees. Devandas notes that people with disabilities are not represented on these committees and their views are regularly dismissed. It is, therefore, necessary to address these issues through "disability bioethics", this is, bioethics that recognizes the rights and concerns of persons with disabilities[335].

5.4.1.1. Pressure on disabled people

Preventing or curing disease is an important part of public health policy. However, Devandas points out, disease prevention programs often reinforce stigma against people with disabilities by conveying the message that life with a disability is not worth living[336]. Similarly, biomedical research targeting certain conditions, such as autism, raises the question of whether prevention of such conditions is desirable, as it will lead to a reduction in human diversity.

Efforts to prevent disability, Devandas argues, include the use of genetic prenatal screening tests and techniques such as the already mentioned PGD. Thanks to technological advances, these options are increasingly available, they are faster, safer, and more accessible to prospective parents. But the cumulative effect of individual choices, in order to achieve perfect offspring, means that many future parents choose not to have a child with a disability. Similarly, legislative frameworks that increase the time limit for legal abortion or, exceptionally, allow abortion in the presence of fetal impairment, aggravate the message that disabled people should never have been born. Moreover, because of the fact that the consequence is that fewer disabled people are born, some fear a reduction in disability advocacy and social support for disabled people[337]. However, while Devandas believes that the issue of disability-selective abortion requires greater attention, solutions must not compromise the right of all women, including women with disabilities, to decide whether or not to continue with a pregnancy.

5.4.1.2. Disability as part of human diversity

Enhancement technologies may put in danger the vision of disability as a form of human diversity, which is what Devandas advocates. The 2006 Convention on the Rights of Persons

[335] Devandas, Catalina (2020) "Rights of persons with disabilities".
[336] Ibid.
[337] Ibid.

with Disabilities provides an appropriate framework for addressing the issues of bioethics and disability.

This convention presents the principle of respect for difference and acceptance of persons with disabilities as part of human diversity. This respect for difference implies accepting people with disabilities for who they are, rather than feeling sorry for them or seeing them as a problem that needs to be "fixed". Equally, it also implies that impairment should not be seen as a deficit or as a factor that can be detrimental to human dignity[338].

In addition to this, there is respect for the right of children with disabilities to preserve their identity. The recognition of this right implies the protection of both the static and dynamic attributes of that identity, including, inter alia, their disability. It is therefore recognized as a general principle and obligation to consult and actively involve persons with disabilities in decision-making processes about their concerns.

5.4.1.3. Fighting ableism

In order to preserve the rights of this group, Devandas considers it necessary to fight against systematic discrimination directed towards those who suffer from any handicap, whether physical or psychological. This requires not only raising awareness of their rights to respect and dignity, but also ensuring that prevention strategies and interventions respect their dignity and rights. For Devandas, viewing disability as a human rights issue is not incompatible with the prevention of health conditions, as long as prevention policies are not stigmatizing or discriminatory. Therefore, prenatal genetic testing should be implemented and made available in a way that respects the rights of persons with disabilities and values them as equal members of society. Prenatal genetic testing should never be seen as a cost-effective alternative to providing the highest possible level of care or service to persons with disabilities. Likewise, the decision of carrying out prenatal testing should be the decision of the pregnant woman alone, regardless of her age, reproductive history or disability status[339].

In the fight against ableism pointed out by Devandas, states must consult and actively involve persons with disabilities, together with their representative organizations, in the adoption, implementation, and evaluation of laws and policies on medical and scientific research and experimentation, prenatal screening or assisted dying, among other issues[340]. This implies, therefore, that states should promote the participation of persons with disabilities in the work of national bioethics committees.

[338] Devandas, Catalina (2020) "Rights of persons with disabilities".
[339] Ibid.
[340] Ibid.

5.4.1.4. Conclusions on Catalina Devandas: nine recommendations

In the face of the threat of enhancement technologies, and in the face of the enabling vision, hegemonic in society according to Devandas, she considers the necessity for a cultural transformation of the way society relates to the difference of disability. To this end, she makes the following recommendations:

a) Abolish laws that discriminate against persons with disabilities.

b) Recognize the right of persons with disabilities to free consent to any medical procedure.

c) Prohibition of discrimination on grounds of disability in relation to decisions to refuse or withdraw life-sustaining treatment and organ transplantation.

d) Ensure access to prompt and effective remedies to protect the rights to life and personal integrity of persons with disabilities in the context of medical, scientific, or experimental procedures.

e) Ensure that prevention strategies and interventions respect the inherent dignity and rights of persons with disabilities.

f) Protect the right of the disabled when euthanasia is allowed.

g) Actively involve persons with disabilities and their representative organizations and consult them in all decision-making processes related to medical and scientific practice concerning them.

h) Raise awareness of the dignity and rights of persons with disabilities, challenging negative stereotypes and prejudices.

i) Promote and provide experiences on the rights and values of persons with disabilities in medical and science faculties within universities[341].

5.4.2. Miyasaki and the problem of intentions in liberal eugenics

Liberal eugenics has not only been criticized for the possible consequences it may have on future society and future subjects, or on people with disabilities, as we have just seen. It also faces criticism related to the supposed intentions behind this philosophy.

For Miyasaki, liberal eugenics has the hidden and unacknowledged intention to harm. Similarly, the intended forms of enhancement given in this field have a negative and comparative character in which enhancement is placed in relation to a devalued standard, making the intention to improve one individual or group at the same time an intention to diminish others on whom the comparison depends[342].

[341] Devandas, Catalina (2020) "Rights of persons with disabilities".
[342] Miyasaki, Donovan (2021) "A Nietzschean critique of liberal eugenics" *Journal of Medical Ethics,* pp: 1-8

5.4.2.1. Liberal eugenics and competition

Parents need to help their children to develop their skills. Reading education, for example, could be used to increase the intellectual level. However, Mizayaki wonders why it would be morally controversial for someone to genetically create the "ability of intelligence", or any other ability. He answers that if someone needs a guarantee that their offspring will be improved to such a high degree that they will be much more valuable in some respect than their possible "future potential competitors", then that person's intention is no longer simply to improve their son or daughter, but to improve them comparatively, over and against others[343]. Thus, the eugenic means indicator implies a predisposition to harm.

For this author, liberal eugenics is not aimed at those parents who want their offspring to be competitive, but at those who want to avoid competition by making their sons and daughters always win. This presupposes an intention to harm[344].

This intention of harm occurs because, in the case of improvement of skills of this type, the trait is not evaluated in itself, but in a comparative sense. When we are studying the improvement of a trait, we should ask ourselves: would I be satisfied if this trait were improved in all children except mine? If the answer is yes, then, Miyasaki argues, we are valuing that trait by itself. However, if the answer is no, then this is sufficient evidence that the intention of the chooser of that trait, even if it cannot be reduced entirely to a comparative evaluation, includes an intention to harm[345].

5.4.2.2. Liberal eugenics and subjectivity

Miyasaki considers that liberal eugenics can sometimes become subjective: there are some traits that are valued on their own by virtue of personal taste. At first, valuing a rare trait does not, in itself, seem to be harmful to others. But a trait selected for its rarity is necessarily valued in a negative relation to the commonality, that is to say, it involves negatively manipulating the norm, this is, selecting it against the traits possessed by others. As an example, he alludes to the selection by parents of eye color for its originality. In doing so they devalue, not other eye colors as such, but the fact that they are common, with the intention of damaging the value of those who possess them[346].

It is also possible to find, in this context of subjective eugenics, those traits valued for their identity with a certain group, tribe, or family. In this case, a trait is not valued for its deviation from the norm, but for the identity of a community. Thus, although in principle it does not seem that we are talking about something comparative, as in the previous case, Miyasaki considers that valuing traits for their identity with a group is simply another way of valuing traits for their rarity, so we can bring up the same criticism: the value of distinctiveness is

[343] Miyasaki, Donovan (2021) "A Nietzschean critique of liberal eugenics".
[344] Ibid.
[345] Ibid.
[346] Ibid.

based on the devaluation of the norm, and the attempt to enhance distinctiveness is an attempt to diminish the distinctiveness of those closest to the norm[347].

One example of this was a lesbian couple in the early 21st century, Sharon Duchesneau and Candance McCulloug, who valued a trait, deafness, for their identity, in this case, family identity. Both were deaf and wanted sperm from a donor who had a family history of deaf people in order to have a deaf child. In this regard, Miyasaki comments that the couple's supposed intention to benefit their future child by selecting deafness was to make the child comparatively more valuable than other children through resemblance to themselves, an intention that is only understandable given the devaluation of difference from themselves. Thus, the intention was to make the other children less valuable than themselves. The fact that a parent - in this case two - enjoys similarity with their offspring does not imply an intention to harm, but trying to produce that similarity does[348].

What about those traits that are valued simply for aesthetics, regardless of their rarity or identity with a collective? Miyasaki considers that this is improbable because eugenic selection will always be informed by knowledge of the norm. For example, if someone wishes to select musical ability as a trait, it is because they know that it is a distinctive trait that increases the value of the offspring to themselves and others relative to the norm. Hence, one chooses in the knowledge that it is not the norm: although one is partially motivated by non-comparative value, one is not only motivated in this way. Miyasaki warns that the future parent is aware that, as someone with great musical ability, his or her offspring will be more valuable than a child without such ability, and that, as someone who has such ability, he or she has more value to others, since others may enjoy his or her music, but not everyone has such talent[349].

5.4.2.3. Liberal eugenics and objectivity

Miyasaki considers that liberal eugenics can also be based on supposed objective values. For example, in the fourth chapter of this thesis, we saw that Dov Fox claims to base the principles of liberal eugenics on what he calls "Natural Primary Goods", which are those natural traits that can be of great use for any life project, such as immunity to disease, greater resistance to injury, better memory, absence of disability, etc. Among all these traits, Miyasaki believes that those related to our health are the most likely to be considered valuable traits in their own right[350].

However, drawing on Nietzsche's philosophy, he adds that no single trait is always valuable or beneficial for all people, as the value of a given ability or disability is conditional. In other

[347] Miyasaki, Donovan (2021) "A Nietzschean critique of liberal eugenics".
[348] Ibid.
[349] Ibid.
[350] Ibid.

words, the same ability or disability can be beneficial or detrimental to different individuals under different conditions.

For Nietzsche, the power of an ability depends on two things: first, on its relation to all other abilities and, second, on the relation of that ability to the situation of the individual or the environment. He also sees our "self" as a set of impulses, an amalgam of abilities of different forces that demand and give satisfaction through their exercise. Therefore, a skill is valuable or contributes to an individual's well-being only if it is powerful in relation to his or her other impulses and to the external world[351].

Nietzsche himself serves Miyasaki as an example. Throughout his life, he suffered from various diseases that left him almost blind, and sometimes bedridden. However, in his final writings, he repeatedly expresses his gratitude for his poor health. This forced his early retirement, which gave him more time and intellectual freedom for the development of his works. His health condition also forced him to leave Germany in search of a better climate, freeing him from the influence of an intellectual and cultural environment that he found stifling; and by preventing him from working continuously for prolonged periods, it inspired him a stylistic innovation, forcing him to express his ideas in short, dense aphorisms[352].

Nietzsche believes that without his poor health condition, his greatest achievements would not have been possible. This, according to Miyasaki, provides a plausible possible case in which the objectivity of liberal eugenics is false: no trait, not even health, is intrinsically valuable or harmful. In other words, for Miyasaki the objectivity of traits is uncertain, we do not know whether a trait is valuable to everyone or not, or whether its presence is more valuable than its absence, so we cannot justify its selection or non-selection on that ground alone[353].

Thus, qualities such as good health, which are often claimed to be objectively valuable for all, are instead subjectively valuable and only in relation to their power in an individual subject. Consequently, such qualities are valued through negative comparison and consequently share the problem of intentional harm that afflicts subjective eugenics[354].

5.4.2.4. Conclusions in Donovan Miyasaki: the burden of proof lies with the eugenicist

Miyasaki believes that liberal eugenics has no real capacity for objectivity, and will always be subject to subjective values and comparisons. One ability cannot be promoted without knowingly, although not clearly, diminishing other abilities. Thus, the burden of proof that liberal eugenics is a feasible path lies in those who defend it: it may be ethically justified to intentionally harm the power of an ability only if it is possible to prove that the promotion of that ability will increase the child's well-being, which, as we have seen, cannot be assured.

[351] Miyasaki, Donovan (2021) "A Nietzschean critique of liberal eugenics".
[352] Ibid.
[353] Ibid.
[354] Ibid.

For Miyasaki, liberal eugenic intervention, even if possibly beneficial, cannot be justified because it requires the active intention to harm abilities without the certainty that this harm will be compensated by the benefits of the eugenically selected ability[355].

[355] Miyasaki, Donovan (2021) "A Nietzschean critique of liberal eugenics".

6. POSITIONING AND FINAL REMARKS

During the last chapter of this thesis different authors from different fields of study who oppose liberal eugenics from several approaches, and with different ideologies, have been studied. In this final chapter, I will try to answer those criticisms, following a perspective that supports genetic enhancement and enhancement technologies. However, before that, I will expose a recap of the topics that have been analyzed.

6.1. Recap

During this thesis, an analysis of old eugenics has been taken, focused on its origins in Francis Galton, first purposes, distinctions between negative eugenics and positive eugenics, and how it was developed in countries such as Nazi Germany, United States or Spain during Franco's regime. Likewise, the terrible consequences of this movement in society, especially occidental, and why the concept of eugenics has fallen into decline have been visualized.

Starting from the task that we might call "origins", the rise of "liberal eugenics" has been studied, among the examination of thinkers like Joseph Fletcher, Nicholas Agar, or Allen Buchanan, their thoughts and how they set diverse purposes in this new philosophy of bioethics. Different distinctions in the area of bioengineering have been underlined, such as therapy/enhancement or somatic cell modification vs germline cell modification, and the ethical problems that they could establish, mainly in areas such as the clash between the agents given in the new being since its birth (nature) and the external agent given in the environment that have the power of influence in the new being (nurture).

Deep analysis of the "enhancement technologies" have been also taken into account, focusing on cloning, genomics and PGD, CRISPR, and artificial wombs. Their functioning has been studied, among several experiments carried out with them, benefits that they can bring into the future, as well as different critics due to possible bad consequences that they could release in the future.

On the other hand, a study about liberal eugenics in a social and political context has been carried out. In this background, it has been analyzed how some liberal eugenicists, such as Buchanan, Brock, Daniels, or Wikler pretended to achieve equality of opportunities among individuals in society, as well as distributive justice. *Level Playing Field Conception*, among its two forms, this is, "social structural view" and "brute luck view", has been taken into account. Furthermore, regarding genetic modifications, two political models (public health model and personal service model) have been put into debate. Inside this debate, the role of bioengineers, as well as the role of future parents, have been discussed, among their reproductive freedoms.

Finally, a study about several critics against liberal eugenics has been carried out, implying bioconservatives such as Habermas, Fukuyama, or Sandel, as well as modern critics given

by modern tinkers like Devandas or Miyasaki. Suck critics have been focused on diverse problematics, like the identity of new beings, the essence of humanity, the responsibility of parents, the rights of people with disabilities, of the intentions behind those who promote this new philosophy.

Now, as I claimed before, it is time to give answers to such criticisms.

6.2. Habermas, irreversibility, and human nature

It is possible to divide Habermas's critique into two parts.

The first problem is the asymmetry that appears between present and future human generations, and how this issue affects the individual identity and autonomy of future beings. I consider that this first objection against liberal eugenics might be not too much effective, because asymmetric relations among different generations of humans already exist, not entering the field of bioethics. Since one generation exists or existed before another, non-bidirectional affections could be created. Actions carried out by our ancestors in WW2 or Cold War have established the international world as we know it. In the case of Spain, our country would not be the county that we know without the actions perpetuated by several individuals in the Spanish Civil war and Franco's regime. These are some examples of non-asymmetric relations, in which it is not possible to affect past generations in the way they affected our daily social life, no matter how much we want this. Such relations can affect future generations and how they perceive the world, and also their way to be because they will set up their daily life.

Relation between parents and children, in analogy, is also the same kind of non-symmetrical relationship. Children nurturing, guided by parents, will be essential for their social and professional future. This would not be possible in reversal. Nevertheless, Habermas might be right in pointing out that an enhancement technology, like CRISPR-Cas9, used to modify and genetically improve a fetus, could mean a new kind of affection to future generations. At first sight, and as it was observed, this could suppose a huge ethical and moral issue.

Notwithstanding, the researcher of philosophy at Sydney University, Walter Veit, among other philosophers who support enhancement technologies, claims that actions guided by future parents might already affect future offspring even before birth. For example, usually pregnant women evade alcohol for avoiding negative affection to future descendants. From Veit's point of view, this action is analogous to embryonic selection for minimizing the chance to have a future child with severe cognitive disabilities[356]. Thus, if actions carried out by a future mother for avoiding possible handicaps in offspring, aiming to try they are born in the best way possible, through a healthy diet, are not ethically problematic, then, why do

[356] Veit, et al. (2021) "Can eugenics be defended?" *Monash Bioetchis Review,* vol 39, pp: 66-67

genetic modifications in future offspring have to be always something ethically not permissible?

On the other hand, I agree with Habermas when he says that future parents could project too many expectations in future offspring after genetic modifications, and these expectations could not be fulfilled. In the same way, he also claims that future children, once they know that they have been genetically modified, could develop a critical point of view about it and reject it. These two critics are true and they should be taken into consideration. Because of this, I claim that it is indispensable to follow two principles shown before regarding genetic modifications in future human beings.

The first principle would be Fox's Natural Primary Goods, which claims that every genetic modification must be oriented to enlarge possible projects of life for future offspring. Thus, they must be useful modifications for every kind of life (like the improvement of the immune system, more resistance against injuries, etc.) and not oriented to a form of life or profession in specific. The second principle pointed out in the fourth chapter of this thesis is, as Daniels and Brock claimed, parents cannot be focused on their own interests when debating enhancement technologies, but on the interests that future offspring could have. In other words, if parents fight for defending their interests regarding enhancement technologies in future offspring, then that is not identical to doing their best for the offspring. For instance, using these technologies requires previous paternal responsibility.

The second part of Habermas's critique would be the section oriented to human nature. Habermas seems to be worried about how enhancement technologies would affect our nature, arguing that if we do not observe our body as something natural then we could not be able to observe ourselves as "be itself". In the same way, he also defends the importance of naturalness in birth and claims, like Arendt, that when new human beings are born, then, a difference between destiny by socialization and destiny by nature of an organism starts to emerge. Both Habermas and Arendt conclude that persons are only able to see themselves as authors of attributable actions and sources of authentic intentions if they suppose the continuity of a "be itself" that feels identic with itself during its biography. They also point out that an individual whose destiny is only a product of socialization, something suffered and determinant, then her "be itself" would end up escaping from their hands.

I consider that in these critics Habermas commits the "appeal to nature fallacy" or "ad naturam". This fallacy consists in considering that something is correct, good, or valid because is natural, or something is bad, incorrect, or invalid because is artificial or invalid[357].

Human nature does not suppose something good or bad itself, but a combination of features and capacities that composes us as species. Such features might be good, like the capacity of grabbing objects thanks to our thumb, or bad, like vulnerability against several diseases.

[357] Curtis, Gary (2018) "Appeal to Nature" [online] *Fallacy Files* https://www.fallacyfiles.org/adnature.html [consultado el 18 de marzo de 2022]

Thus, if the possibility of enhancing or improving a negative feature for the new being exists, aiming to amplify their possibilities of ways of life, and the process is safe, then, why this action would be immoral?

In the same way, naturalness in birth, as Habermas and Arendt defend, does not seem to be something necessary for being a "be itself". In 1978 Louise Brown, the first human product of IVF, was born: it is hard to see naturalness in this birth. However, it does not seem that Brown has difficulties finding her "be itself". Even she was giving speeches to future parents about the process of IVF and considers that it is a pity that this method is still taboo[358].

6.3. Fukuyama. Utilitarian reduction, human essence, and therapeutic cloning

Inside Fukuyama's objections against the enhancement technologies that form liberal eugenics is the reduction of diversity of human nature because of a utilitarian view focused on pleasure and pain. I argued before that the fact that something is natural or not does not mean that is good or bad. On the other hand, concepts such as "pleasure" or "pain" are abstract and complex terms that can be understood in several ways, even inside the philosophy of utilitarianism.

For example, Jeremy Bentham, father of utilitarianism, claims that different notions of pleasure and pain are different in terms of quantity but not in quality[359]. On the other hand, Bentham's student, John Stuart Mill, claims that pleasure and pain can indeed be different in terms of quality because intellectual pleasures are superior to physical pleasures. Mill argues that, for example, it is better to be a Socrates unsatisfied than a pig satisfied[360].

As it might be observed, notions of pleasure and pain might be understood in diverse ways, and hence focusing on these notions does not mean necessarily a reduction of human nature and complexity. At the same time, as Buchanan, Brock, Wikler, and Daniels claim in the fourth chapter, one purpose that liberal eugenicists defend with the use of enhancement technologies is creating a society in which individuals who do not have a limited number of opportunities of life due to physical or psychological handicaps. From my own perspective, enhancement technologies might be able not only to avoid a reduction of opportunities in life but also to amplify them. With higher possible ways of life new forms of understanding pleasure and pain could emerge. Thus, enhancement technologies do not mean necessarily a reduction of human complexity as Fukuyama claim. They could be even the opposite.

[358] Sánchez, Nacho (2020) "Louise Brown, la primera bebé probeta" [online] *El País* https://elpais.com/elpais/2020/03/06/mamas_papas/1583486018_035212.html [consultado el 18 de marzo de 2022]
[359] Bentham, Jeremy (2000) *An Introduction to the Principles of Morals and Legislation,* Canadá, Batoche Books (versión original en inglés, Reino Unido, 1780), p: 31
[360] Mill, John S. (2009) *Utilitarianism*, Nueva Zelanda, Floating Press (versión original en inglés, Reino Unido, 1863), p: 19

Fukuyama also defends that something like liberal eugenics might be a threat to human essence, this is, "factor X". He defends that worrying about enhancement technologies is legitimate, because there is a fear about losing our human essence, or something essential in us, in terms of who we are or where are we going.

From my point of view, it is confusing to defend something that we do not know how exactly it is or how could it be. The idea of human essence, or what defines us as humans, does not seem to be clear for Fukuyama, because he only calls this something as "factor X" and claims that it is an organization of features that define us as species, and it cannot be reduced into one single characteristic, but also it cannot be defined as a sum of features. I consider that his answer is comprehensible because how to define the human essence is not an easy task, but it is not enough.

Nevertheless, I claim that trying to defend human essence might be a lost battle, no matter how we define it or how much we deepen in bioethics. The human essence is destined to disappear, whatever it is or how we call it. We could be extinct in the future or transformed into posthumans, as transhumanists suggest, or simply evolved naturally as our ancestors did. Homo Sapiens Sapiens is not an end, but only a step in the ladder of evolution. The Israeli historian, Yuval Noah Harari, seems to claim this in his work *Sapiens,* published in 2014. Harari claims that on the eve of our evolution, we must ask ourselves: what do we want to become?[361] I do not think that I can answer this complex issue, but I claim that its ethical and philosophical analysis is necessary. In the same way, I think that a bioethics point of view that claims in favor of defense and protection of the human essence, as Fukuyama does, supposes trying to avoid Harari's question, this is, avoiding the inevitable.

Finally, is also remarkable his critique against therapeutic cloning and the way it might threaten future offspring. In the third chapter of this thesis, I analyzed Kass's critics against reproductive cloning, but not Fukuyama's critics against this other form of cloning.

Firstly, I claim that Fukuyama's objection can be a little bit confusing because he considers therapeutic cloning as a threat to future offspring. However, as Roussenau says, there is no "future offspring" in therapeutic cloning[362]. In other words, the aim of therapeutic cloning is obtaining stem cells for creating organs, not human reproduction, and hence, the embryo in therapeutic cloning is not planned to develop as a human being. Thus, from this point of view, as Roussenau defends, there is no damage to human dignity.

It is true that, as Fukuyama has claimed, something like an embryo deserves certain moral status, but not as high as a human being (in the case of therapeutic cloning, it is a 4 or 5 days

[361] Harari, Yuval Noah (2014) *Sapiens. De Animales a Dioses.* (trad.) Ros, Joandomènec, España, Penguin Random House, p: 377
[362] Soniewicka, Marta, et al. (2018) *The Ethics of Reproductive Genetics.* Springer, Polonia, Ed. Soniewicka, Marta, p: 139

old cloned embryo). However, although I agree with Fukuyama that embryos deserve certain moral status, I disagree with him in terms of the level of that moral status.

I consider that something or someone deserves a certain level of dignity and recognition if it possesses, at least, individuality and/or particularity as characteristics. For example, a subject possesses a unique and unrepeatable history that cannot be replaced, plus the capacity to taking moral choices. Thus individuals deserve the maximum respect possible, as well as the highest dignity in society.

In the case of a zygote, it is notable to know that, once it is created, it has the possibility of splitting into two or more zygotes, resulting in two or more individuals[363]. Due to this fact, it is hard to observe the characteristics of individuality or particularity in a five-day-old embryo. Thus, although something like a 2 months old fetus deserves certain moral status (not as high as a human), something like a 5-day-old embryo should not have such consideration, and much less the consideration that a human has. Thus, its recognition of dignity and moral protection decreases, and hence, therapeutic cloning is less immoral than Fukuyama suggests.

Moreover, thanks to therapeutic cloning and stem cell research, it could be possible to cure or prevent diseases and disabilities[364]. This means not only the possibility of avoiding pain and physical or psychological suffering but also premature death and improvement of life quality.

6.4. Sandel. Possible answers for the triple problem and the aim of genetic enhancement.

At the end of his critics, Sandel claimed that liberal eugenics has a triple problem as far as humility, responsibility, and solidarity are concerned.

Firstly, Sandel claims that paternity and maternity suppose a school for humility because parents are open to the unexpected since they do not know how the offspring will be, and hence this gives them a range of humility. Nevertheless, Sandel defends that this will not happen if enhancement technologies were available for those who plan to have a family.

I consider that this first critique presents several weaknesses. Letting offspring utterly to randomness could mean banning abortion completely, including selective abortion. This leads to a decrease in reproductive freedoms for future parents, especially women. Moreover, this randomness could mean not fighting for the interests of future offspring, in the case of embryos or fetuses with handicaps that might be prevented or cured with bioengineering.

[363] Soniewicka, Marta, et al. (2018) *The Ethics of Reproductive Genetics.* p: 143-144
[364] Devolver, Katrien (2015) *The Ethics of Embrionic Stem Cell Research.* Oxford: Oxford University Press. p:3

Sandel's humility means letting human reproduction to randomness, and as Fletcher suggests, this reproductive roulette must end if that possibility exists. Parents deserve the right or rejecting enhancement technologies. Nevertheless, they also deserve the right to use them, at least limitedly. As Fletcher claims, choosing how to reproduce is a human act, because children who are born are really chosen[365]. But not every randomness should end. Features like sex, race, sexual orientation, etc. should not be selectable, because they are not Natural Primary Goods (having a determined sex or skin color does not mean, or should not mean, more possible ways of life). However, if the presence or absence of a feature means more or fewer opportunities in life for offspring, then that feature should be debated for its selection.

Secondly, regarding responsibility, Sandel claims that with the promotion of enhancement technologies our responsibility as future parents will also increase, and failures in offspring will be more attributable to parents' actions and choices. For example, Sandel argues that if a current basketball trainer can blame a player for failing a shoot, then, in the future he could blame him for not being tall. The trainer could blame future parents for not deciding to genetically modify his height.

It is true that, as Sandel claims, responsibility in future parents will increase because of genetic modifications. However, I consider this increase in responsibility unavoidable no matter enhancement technologies. All power implies responsibility, and knowledge is a kind of power, and that follows a responsibility consequently. Our species has been obtaining knowledge over time. Thus, the unique way for future parents for avoiding responsibility is if they avoid knowing new things, like knowing new methods of reproduction. At this point, we should ask if it is ethical to avoid learning certain bioethics topics, even if they are available for its learning.

Notwithstanding, this does not mean that the parents who chose not to use enhancement technologies are not free for taking that choice, despite the responsibility that it supposes. Such choice must be respected and protected. This last claim links with his third criticism against liberal eugenics, which is the lack of solidarity. Sandel claims that insurance companies, once they know the genetics of their clients, they could deny covering them with medical insurance.

Although sanity indeed varies depending on the country (for example, Spain has Universal Health Care and the United States does not), it is also true that genetic knowledge could affect us not only in terms of medical insurance. Car insurance might be another example. They could deny their service if they discover that some of our genes are related to visual diseases or illnesses that could affect the capacity of driving a steering wheel. This issue, as Daniel Wikler claims, could create "genetic ghettos", and hence, it is necessary to protect individual

[365] Fletcher, Joseph (1974) *The Ethics of Genetic Control.* p: 168

privacy[366]. From my point of view, such information must be studied and analyzed carefully, especially in scopes like criminology.

However, although privacy plays an important role in individual welfare, it is not enough. As Wikler points out, habitually genetic information can be deduced thanks to family medical histories[367], and hence, such histories should be also protected, as well as parent choices for genetic modifications in the offspring. Defending enhancement technologies implies not only supporting them but also supporting the right of those who are opposed to them. At the same time, I claim the necessity of Universal Health Care, which can offer several services to citizens and protect those who are underprivileged. Insurance companies (medical in this case) will fight for their own interest and not for the client's interest. As Agar argues, liberal eugenics says nothing about which economic system must be followed[368], which is a crucial point when dealing with how to apply enhancement technologies.

Finally, I disagree with Sandel when he claims that in genetic enhancement medical means are used for non-medical purposes. This scenario could indeed happen, but it is also true that genetic enhancement could be used for medical purposes like enhancing the immune system or resistance against injuries. From my point of view, genetic enhancement aiming for medical purposes is as ethical for its implementation as genetic therapy, because both have health as an end for future offspring.

6.5. Devandas. Rights of the person with disabilities

Among current critics, I will focus firstly on Catalina Devanda's critics in order to analyze Miyasaki's arguments later.

Devandas's worries about how liberal eugenics might affect individuals with disabilities are utterly comprehensible. However, it has gaps in certain aspects. For example, she claims that the view of those people who suffer from disabilities must be taken into consideration when dealing with a decision regarding medical and scientific practices that are related to them.

I consider her proposal interesting, moreover, I defend that it could give rise to the creation of work quotas for disabled people in areas such as ethical committees in hospitals. Nevertheless, it could be hard to achieve, because not every disabled person has the capacity for autonomous thought. In other words, certain handicaps impede the individual from taking ethical and individual points of view.

[366] Buchanan, et al. (2000) *From chance to choice: genetics and justice.* Reino Unido, Cambridge University Press. p: 326
[367] Ibídem, p: 327
[368] Agar, Nicholas (2021) "Confessions of a philosophical shit-stirrer", [online] *ABC* https://www.abc.net.au/religion/confessions-of-a-philosophical-shit-stirrer/13611942 [consultado el 29 de marzo de 2022]

In the fourth chapter of this thesis, I spoke about Tay-Sachs disease, which affects the brain, causing physical and mental troubles. Those who suffer from this illness not only lack the capacity of making rational choices, but also they usually pass away approximately at the age of 5 years[369]. Thus, it is not feasible to consider the point of view of those who suffer from Tay-Sachs in the debate on medical practices related to this illness. Moreover, Devanda's view might clash here with Fukuyama's view, because he claims that those who suffer from Alzheimer's will lose their right of voting in elections. Thus, Fukuyama will not visualize Devanda's view as something feasible, because political proposals that might affect the lives of individuals with Alzheimer's could be at stake in elections. From my point of view, Fukuyama's perspective is more accurate, at least in this area.

From my point of view, liberal eugenics is focused on diseases and disabilities, not against those who suffer from them. Nevertheless, this claim might be problematic, especially when dealing with mental handicaps. Heidi Mertes and Seppe Segers, both researchers of philosophy of science at Gent University, argue that genetic modifications in fetuses with psychological anomalies, such as Down Syndrome, are more controversial than modifications for preventing or curing physical anomalies because many people could think that eliminating Down Syndrome would mean also eliminating characteristics of personality[370].

However, since they are genetic modifications in nasciturus, it could be hard to visualize some personality damage, because it is something that lacks personality. At the same time, as I defended earlier, in this kind of decision, future parents should fight for the interests of future offspring, this is, a higher number for their possibilities of life. Thus, we should ask: Would it be better if my child has Down Syndrome or not? Devandas might answer by claiming that if we modify fetuses with anomalies, then part of human culture, like signal language or braille, might disappear. She could be right. However, at what price should we keep that part of our culture? Is it justifiable to keep it and then not give future humans more opportunities in life? My answer to this last question is no.

On the other hand, Devandas also claims that a society that defends liberal eugenic values, adding an ableist context against disabled people, could give rise to a lack of solidarity and acceptance regarding diversity and difference, concerning those who suffer from diseases or disabilities. For this reason, she defends, it is necessary to fight against the message which claims that the life of disabled people is not worth it.

I agree with her on the necessity of fighting against ableist discrimination. I also claim that the life of people with disabilities could be worth it. Even it could be sometimes more satisfactory than the life of somebody without handicaps. However, the question that we

[369] Anzilotti, Amy (2020) "Enfermedad de Tay-Sachs" [online] *KidsHealth* https://kidshealth.org/es/parents/tay-sachs.html [Consultado el 25 de marzo de 2022]
[370] Mertes, Heidi, Segers, Seppe (2019) "Does human genome editing reinforce or violate human dignity?" *Bioethics*, 34: 33-40

should ask is not "could the life of a person with disabilities be satisfactory and fulfilled?" but "how many chances have a person with disabilities for having a satisfactory and fulfilled life, and how many chances has a person without disabilities for the same thing?" Environment indeed plays an important role regarding if individual life could be fulfilled or satisfactory or not. Future humans could aspire to some life projects or not, or a higher or lower range of opportunities in life, depending on the society in which they are living or depending on their parents or both. Notwithstanding, the presence or absence of disabilities plays also a role in opportunities in life. For example, a person who suffers from blindness will have several difficulties in being an aircraft pilot, unless she possesses something that compensates for her lack of vision. Therefore, although the life of somebody with handicaps could indeed be fulfilled or even better compared to somebody without them, it is also true that the possibilities for this happening are lower in comparison to somebody without them.

Disabilities, as Buchanan says, suppose an imbalance between the capacities of an individual and the tasks that society demands[371]. This means that environmental modifications, such as innovations in societal behavior or making the access of people with certain handicaps to the working market easier are necessary for social progress and individual welfare. These measurements could mean that some disabilities could be not considered disabilities anymore. However, as Buchanan also claims, there are two ways for preventing disabilities. The First would be, as it was mentioned before, modifying the environment for avoiding the fact that some handicaps limit some individuals from living in society; the second way would be genetically modifying future offspring for avoiding handicaps that could be disabilities in the future[372].

Both measurements, genetic and environmental modifications, are necessary for social and human progress. From my point of view, taking only one of these measurements and not giving importance to the other is would mean taking one of the two determinist points of view that I pointed out in the second chapter of the thesis, this is, genetic or environmental determinism.

6.6. Miyazaki. Capacities, skills, subjectivity, and objectivity

Now I will analyze Miyasaki's critics against liberal eugenics, which are focused on the intentionality of those who defend it.

Miyasaki claims the existence of a bad intention in the project of liberal eugenics because it is pretended to hurt capacities. From his point of view, there is a devaluation against a norm in genetic enhancements. In other words, it is pretended to enhance a future human or group of humans, but at the same time, it is pretended to diminish the others who depend on this

[371] Buchanan, et al. (2000) *From chance to choice.* p: 288
[372] Ibídem. p: 287

comparison. He claims that liberal eugenicists consider certain "normalities" of humanity as something negative, and for this reason, they try to enhance some individuals or groups by making their capacities superior to normal capacities and, in this way, devaluate those who have capacities according to such normality.

I do not consider that liberal eugenics has the intention of hurting groups of individuals at the expense of enhancing others. Without a doubt, liberal eugenics pretends to enhance the human species by employing science and technology but, beyond that, its intention, as Buchanan claimed, is equality of opportunities among all individuals.

Liberal eugenics has an individualistic but not selfish approach. A selfish ideology pretends to benefit one or some individuals at the expense of the discomfort of others. Miyazaki likely visualizes liberal eugenics in this way. However, an individualistic ideology seeks to prioritize individual choices if they are not in detriment to others. This is why, as it was claimed in the fourth chapter, the distribution of goods through social structural view is necessary. Enhancement technologies must be available for future parents, but limitedly, so they can decide what could be better for the offspring.

On the other hand, Miyasaki focuses, perhaps excessively, on the notion of "ability", and he claims that future parents usually choose to enhance an ability not because that ability is valuable for them, but because of its value in comparison to the others. In other words, he claims that future parents do not seek to enhance something like speed because they like speed, but because they want a child faster than the others.

I consider, at this point that it is important to distinguish the notion of "ability" and the notion of "feature". A feature is identifying characteristic, rather individual or collective, physical or psychological, that permits distinguishing the being or group of beings from the others. On the other hand, an ability is a feature that supposes the capacity for performing an action in a certain way. Therefore, every ability is a feature, but not every feature is an ability. Features that are abilities require the subject to be active, while features that are not abilities do not require this. For example, the capacity of running fast is an ability, but whole immunity against certain diseases is only a feature.

I consider that liberal eugenics focuses, or should be focused, on features that are not abilities. On the contrary, it could give rise to what Agar calls *selfdefeating*[373], a phenomenon of everybody enhancing their offspring for trying to make them better than the rest, having the result of nobody being better than others because all children have superior skills. *Selfdefeating* could appear when dealing with ability enhancement, especially if the purpose is competition. I consider that in this context there could be an intention of harm in liberal

[373] Agar, Nicholas (2004) *Liberal Eugenics. In defense of Human enhancement*. Estados Unidos, Blackwell Publishing, p: 127

eugenics, as Miyasaki suggests. Notwithstanding, this intention can be avoided if the modifications in abilities for the purpose of competition are evaded.

In the same way, it is also necessary to evade subjective modifications, such as modifications in features valued because of esthetics, like beauty, or because of its rareness or attribution to a group, tribe, or ethnicity. In this sense, Miyasaki is right when he claims that liberal eugenics could be subjective because it is in subjectivity where individualism might transform into selfishness. In subjective eugenics, the parent's preferences will prevail against the offspring's preferences, and this could provoke a risk of harm.

However, harm intention in subjective liberal eugenics is not always as Miyasaki claims. In the case of Sharon Duchesneau and Candance McCulloug, when they select a deaf offspring then harm is not oriented to the others because of their intention to benefit their future child, trying to give her more value in comparison to the others. In this case, harm is oriented to their own offspring, because if they give them deafness on purpose, then they are diminishing their future possibilities of ways of life. When I was analyzing Devanda's critics, I claimed that although somebody with disabilities might have a fulfilled life, or even better than a normal individual, chances for this happening are comparatively less. I defend that the same criticism could be applied to this case, and hence, the action of this couple would not be ethical.

But, what happened when liberal eugenics tries to be objective? Previously, I pointed out the importance of Fox's Natural Primary Goods. However, Miyasaki disagrees with Fox's arguments and claims that even something like immunity against disease could have subjective value. For his argument, he quotes the example of Nietzsche, who defended that if not for his poor health, his most important achievement as a philosopher would not have been possible.

It is true that absolute objectiveness does not exist, therefore even Fox's objectivities could be subjective in the end. Nevertheless, although there is no pure objectivity in Natural Primary Goods, I consider that these are enough objectives for being considered because they could be useful for any kind of life. Moreover, as Fox suggests, characteristics like resistance against injuries are just simply useful[374]. Some goods, such as better memory or intelligence, could be ethically problematic, because something like memory could be considered an "ability", due to its importance to be active in some task for showing it. Same thing with intelligence. Nevertheless, other goods, like resistance against diseases or disabilities, could be considered as characteristics without being considered as abilities, and therefore, their enhancement is more plausible.

In the same way, I consider that Miyasaki falls into a generalization based on a particular case when he quotes Nietzsche for justifying Fox's supposedly subjectivity, this is, quoting

[374] Fox, Dov. (2007) "The illiberality of Liberal Eugenics", *Blackwell Publishing,* vol. XX, 0034-0006

this case he concludes that even health has subjective value. Again, as I said when I was analyzing Devandas, we should as here: how many possibilities has a person with handicaps (with a disease in this case) for having a fulfilled life, and how many possibilities has that person without handicaps for the same thing? Perhaps Nietzsche would never have had success in philosophy without his poor health state, as Miyasaki seems to suggest. However, has a philosopher more probability of success being a healthy individual o being a non-healthy individual? I consider the answer obvious. Although health is not a guarantee for success, it increases the possibilities for it.

6.7. Final remarks

The debate of liberal eugenics is very wide in the scope of philosophy and bioethics. Sadly, it is also a very polarized debate, and I consider that the more the enhancement technologies progress the more will it be[375]. Some authors, such as the Hindu sociologist Sheila Jasanoff, or the professor of philosophy at Dublin City University Bert Gordijn, claim that scientific and technological advances are changing the collective idea of desirable futures that are obtainable by science and technology, and such changes are going to be so deep that they will affect our perception about who we are and how we desire to be governed[376].[377]

Liberal eugenics can indeed condition future individual's life in terms of identity and objectives. But it is also true that in human society, especially occidental, our behavior, and purposes have been conditioned and keep being conditioned by eugenics. Agar, among Veit and other bioethical philosophers, claims that all human societies make use of eugenic practices that have been utterly accepted. For example, in occident, most pregnant women take a series of prenatal tests aiming to find out if the fetus presents anomalies or not. In many cases, if the fetus has it, then they decide to abort it. Other examples would be the prohibition of endogamous marriages, and the provision of genetic advice for the ethnical groups at risk for preventing the birth of children with anomalies, like Tay-Sachs[378].

Therefore, liberal eugenics is an extremely important area of debate in our current XXI century. Avoiding the dilemma about what genetic engineering and enhancement technologies could suppose seems to be getting more inviable due to the rapid and unstoppable advance of science and technology. In this last chapter, I have presented my inquiries about the philosophical and bioethical debate that supposes the proposals of those who defend this way of enhancing the human species. There is still a lot to study, as well as

[375] Veit, et al. (2021) "Can eugenics be defended?"
[376] Jasanoff, Sheila (2019) *Can Science Make Sense of Life?* Reino Unido, Polity Press, p: 13
[377] See: Gordijn, Bert (2006) "Converging NBIC Technologies for Improving &Human Performance: A Critical Assessment of the Novelty and the Prospects of the Project" *The Journal of Law, Medicine and Ethics,* vol. 34, pp: 726-732
[378] Veit, et al. (2021) "Can eugenics be defended?"

open debates regarding enhancement technologies such as AW or CRISPR, and at what grade future humans should be modified or improved[379].

Nevertheless, I claim that it is possible to present a reasonable defense of this philosophy, as I was trying to prove in my analysis. We are not like the other species that populate this planet. We can be conscious about who we are, where are we going, and take responsibility for our way of life, and avoid natural randomness, at least partially. Such actions require reflection and wisdom because bioengineering is a double-edged sword, but I consider that the possibility of its use in our offspring is still far away. Therefore, whatever happens until then will depend on us.

Liberal eugenics supposes a very complex philosophy and debate, embracing topics like medicine, politics, social sciences, or bioethics in genetic engineering. Embracing everything in a single work results in a hard and complex task. In this thesis that work was tried, and it has concluded that liberal eugenics, beyond supposing an interesting and current study, according to XXI Century, can be, from time to time, a plausible way for solving bioethics issues, although the ethical and philosophical controversy that supposes.

During this thesis, I tried to clarify different moral debates, like the ethical viability of genetic modification aiming to enhance future human beings or the use of human cloning for reproductive purposes. Such debates, as it was mentioned before, usually don't leave the readers indifferent, and thus, ideological or religious polarizations can end in inflexible perspectives that make a poor contribution to the debate, and hence, it is necessary not only the study of those who promote the philosophy of liberal eugenics but also the evaluation of the counterarguments showed by their detractors, to give an approach to different ideological views in a common field.

Several issues, such as some questions related to the regulation of the enhancement technologies in a hypothetical liberal eugenic state, the ethical dilemma of surrogacy, etc. have been left out. It is pretended to study such ethical issues in future works, enriching the debate if it is possible. Meanwhile, if the thesis, after the study and analysis from the reader, has proved to be useful and interesting for proceeding with readings of the same scope, then, it will have achieved its goal.

[379] See: Agar, Nicholas (2010) "Thoughts about our species' future: themes from Humanity's End: Why We Should Reject Radical Enhancement" *Journal of Evolution and Technology,* vol. 21, pp: 23-31

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