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Genome editing: slipping down toward Eugenics?

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Abstract. In this paper, I will present the empirical version of the slippery slope argument (SSA) in the field of genome editing. According to the SSA, if we adopt germline manipulation of embryos we will eventually end up performing or allowing something morally reprehensible, such as a new coercive eugenics. I will investigate the actual possibility of sliding towards eugenics: thus, I will examine enhancement and eugenics both in the classical and liberal versions, through the lens of SSA. In the first part, I will discuss the classical eugenics from a historical perspective and conclude that classical eugenics is morally deplorable; but by currently accepting genome editing I argue that it is not possible to 'slip' into classical eugenics. Then, I will analyze liberal eugenics: I will consider Habermas' and Sandel's objections to liberal eugenics and genetic human enhancement. Subsequently, I will reply to these arguments affirming that, although it is not possible to refuse any form of genetic enhancement, liberal eugenics would not consider the principles of justice, non-maleficence, and non-instrumentalization; hence, it should be considered not morally acceptable. In addition, I will support the thesis according to which the possibility of relapsing into liberal eugenics is more likely than relapsing into classical eugenics. Then, I will present a strategy that, while avoiding falling into the undesirable scenarios related to SSA, still accepts some application of germline genome editing of embryos and gametes. In such a way, I will show that even if we accept the plausibility of a certain slip into an undesirable scenario, SSA does not offer conclusive reasons to forbid any use of germline genome editing technique in both therapeutic and enhancement fields.

Key words: slippery slope argument, genome editing, classical eugenics, libera eugenics, genetic enhancement

Introduction: the slippery slope argument in the field of genome editing

The slippery slope argument (SSA) is one of the most relevant argumentative strategies in the discussion on human germline modification. SSA is widely considered throughout the bioethical debate: in fact, it is often used in relation to issues including abortion, euthanasia (1) and assisted fertilization. According to SSA, allowing germline genome editing treatments would lead to an uncontrolled sliding towards dangerous and undesired scenarios, such as an eugenics drift or the acceptability of enhancement practices; hence, in order to avoid such scenarios, germline genome editing treatments, for both therapeutic and enhancement aims, should be banned. In textbooks of logic and on writing in ethics, SSA is often classified as an informal fallacy, that is an argument whose stated premises fail to support their proposed conclusion (3). However, in this paper I will focus on the more compelling empirical or socio-psychological version of SSA (4-6): according to this version, due to the acceptance of germline genome editing, a gradual acceptance of genetic enhancement could infect the moral sensitivity of society, eventually leading to a new coercive eugenics. Indeed, some psychosocial features could make it difficult to clearly distinguish between ethically acceptable uses of genome editing, such as therapeutic uses,

and unacceptable ones (7). Genome editing is the first technique that enables a positive modification of future generations and therefore requires careful analysis. I will discuss the concepts of eugenics, both in the classical and the liberal version, and of genetic enhancement, through the lens of SSA. Only after having carried out an in-depth ethical analysis of these concepts and having verified the actual undesirability of some scenarios and the real possibility of the occurrence of others, the soundness of the SSA can be assessed. Appreciating these concepts and the historical-cultural context will enable to understand which possible consequences could reasonably occur by allowing germline genome editing practice on human beings. Indeed, according to Anneli Jefferson, Empirical SSAs almost always require an assessment which takes into account the cultural and political context in which the argument is put forward (7). Therefore, I will present a strategy that, while avoiding falling into the undesirable scenarios related to SSA, still accepts some application of germline genome editing of embryos and gametes. In such a way, I will show that even if we accept the plausibility of a certain slip into undesirable scenario, SSA does not offer conclusive reasons to forbid any use of germline genome editing technique in both therapeutic and enhancement fields.

In this paper, I assume a mixed theory that accepts the "lexical" priority (8) of deontological reasons. From this perspective, a priori constraints on the production of maximum aggregate wellbeing are established on the thesis of the people rights. Such rights should be considered as claims that people have by nature or based on a certain agreement or original contract, and they cannot be violated in the name of better consequences for society. Once we assessed that a specific action does not violate any right, we have to evaluate whether its consequences do not lead to a future scenario in which rights could be violated. In this case, I maintain that we have good reasons, based on a deontological perspective, to prevent the beginning of this course of action. Furthermore, I also consider consequentialist reasons to evaluate two or more actions which respect people rights in both current and future scenarios. To assess which action is the most ethically legitimate, we should identity which action produces the best consequences from an aggregate wellbeing perspective. Indeed, according to the lexical priority, consequentialist reasons should be taken into account only after assessing that deontological ones are respected.

Specifically, the rights of liberty and autonomy should be guaranteed by fair equality of opportunity and this essentially translates into some limitation on the excessive accumulation of wealth and the guarantee of equal educational and health opportunities for everybody. I also assume that treating people as mere means and not also as ends in itself (9), even though for overall community wellbeing, is ethically questionable: despite rights-based ethical theories are often in contrast the Kantian idea, that is human dignity is an unnegotiable concept which does not depend on subject's freedom, I believe that these two models are not necessarily in contrast. It is reasonable to affirm that a person has the right not to be used as a mere mean by others, although this action could lead to positive or non-negative consequences for her: the right not to be exploited makes people able to consider themselves free and equal from a moral perspective.

The aforementioned strategy adheres to Tom Beauchamp's and James Childress' proposal which provides a common ground where both moderate deontologists and teleologists could converge (10). In short, I will take into account not only the principles of liberty, autonomy and non-instrumentalization but also non-maleficence, beneficence, and justice.

Eugenics: a controversial concept

During the second half of the 19th century, after the diffusion of Darwinian evolutionary theory, some disturbing proposals were formulated: one of these is eugenics which received concrete political and scientific application during the 1870-1950 period. In this period, the eugenics movement, originating in the United Kingdom, collected such a large consensus as to involve scientists and political institutions from all over the world. The term "eugenics" was coined by Francis Galton who called it "the science of improving stock, which is by no means confined to questions of judicious mating, but which, especially in the case of man, takes cognisance of all influences that tend in however remote a degree to give to the more suitable races or

strains of blood a better chance of prevailing speedily over the less suitable than they otherwise would have had"(11). In his book Hereditary Genius, Galton studied the phenomena of the distribution of talent and the biological hereditariness, and came to two conclusive considerations: a) the number of talented person within families with a good social, moral and intellectual status is significantly higher than in the overall population; b) talent is distributed according to the Gaussian curve and therefore is reasonable to affirm that both the number of talented people and the number of individuals with lower intelligence would decrease over time due through a regression toward the mean (12). According to the author, moral and social norms of solidarity and compassion undermine the driving force of evolution, that is natural selection. This process contributed to human degeneration and it was exacerbated by another aspect: the tendency of so-called "unfit" individuals to reproduce more and, as a result, to outweigh the number of "fit" ones. As a consequence, Galton proposed some measures in order to save the fit traits of human species from an inevitable degeneration: a) positive eugenics, which aimed to guarantee and promote the reproduction between individuals with moral, physical and intellectual qualities above average; b) negative eugenics, which sought to prevent the increase of unfit persons through sterilization, abortion and contraceptive methods. It is important to remember that these measures, according to Galton, were not supposed to be the object of State imposition but of the citizens' free choice: from this perspective, the eugenics project was intended as a sort of civil religion (13). However, after the success of the Galtonian thesis around the world, the eugenics movement raised significant interest in different national states which promoted eugenics policies in both positive and negative form. The content of such programs varied according to the different states; nevertheless, over time there has been a widespread ideological-political use of the eugenics implications aimed at generating consensus. This "populist turn" mixed the original Galtonian convictions with ideological beliefs such as racism, classism, and nationalism (14). It was no longer the scientific genius that had to be sought through the eugenic practices but the purity of the race or the preservation of the middle class: in fact, coercive policies were introduced, e.g., restrictions on immigration, the prohibition of mixed marriages, racial segregation, and mandatory sterilization. Albeit these measures were also introduced by states such as Sweden and the USA, the emblematic case of the application of eugenics principles was certainly Nazi Germany. In this context, in order to preserve the purity of the "Aryan Race", mandatory sterilization programs and physical elimination of the unfit people were implemented; furthermore, mixed marriages between "Aryans" and Jews or other minorities were banned and finally the systematic extermination of ethnic, religious, and homosexual minorities was carried out (15).

Ethics of Eugenics

Overall, eugenics is a controversial chapter of human history, especially with regard to the relationship between ethics and science. Regardless of the different applications, the whole eugenic movement was based on ideological premises and scientific mistakes. The ideological premises are the following:

a) racism, i.e., a common belief spread during the 19th century that was systematically theorized by Joseph Arthur de Gobineau (16). According to such a belief, more equipped and less endowed races may be identified;

b) classism, according to which the richest persons are carriers of superior phenotypic traits, which are the expressions of genes in an observable way ranging from behavior through morphology and intellectual capabilities. Conversely, lower class individuals carry unworthy traits. Class discrimination started to be practiced around the 18th century (17);

c) nationalism, or the political conception that gives centrality to being part of a nation because of shared biological characteristics like common blood or social ones such as culture, language, religion, politics, and belief in a shared singular history (18). During the 19th century nationalism became one of the most significant political and social forces in history due to the ethnic and national revolution in Europe (19).

The scientific mistakes involved in this project were:

a) nowadays, as a consequences of DNA screening, it has been assessed that there is only one human

race: Homo sapiens, though within which there are significant variations in the possible somatic traits as adaption to different contexts. Therefore, the belief according to which that only individuals with certain somatic traits can reach certain intellectual levels is deprived of any scientific support (20-22);

b) the eugenists believed that the condition of human beings in life reflected their abilities and this could be used to assess the quality of their genes. That is, the fact that certain individuals showed certain "social diseases", including poverty, prostitution, drunkenness and criminality, demonstrated that they were unfit and justified the exclusion of their reproduction. Today, the relationship between genetic basis and behavioral traits are still not clear, although recent studies suggest that some phenotypic behavioral traits, such as propensity to practice extreme sports (23) or having higher level of intelligence (24) may have a genetic basis. However, it is known that the majority of phenotypic traits depend decisively on a series of environmental factors: hence, predisposition caused by genes does not necessarily imply the realization of certain behavior;

c) eugenics advocates believed that human genetic pool was in decline because of social inclusion projects which were against evolution's natural tendency to favor the "fit" individuals . Hence, they believed that humanity needed an active contrast of such projects. However, there is no scientific evidence showing the existence of a relationship of inverse proportionality between civilization and genetic wellbeing. This was a scientifically unfounded convictions dictated by an irrational fear;

d) Finally, the prescriptions of eugenists for genetic improvement could not have had a significant effect on society. Having no way of identifying carriers of recessive genes and a sufficient knowledge of the genetic heritage, it was not possible to identify fit and unfit individuals. In some cases, the eugenists admitted the poor effect of eugenics but they argued that these results justified the interventions.

Due to these considerations, it is easy to acknowledge that the eugenics movement is ethically problematic and objectionable. In this period there was a constant violation of human rights: firstly through objectification, denigration, segregation, secondly with involuntary sterilization and finally, in the extreme case of Nazi Germany, through mass extermination. The eugenics movement perpetrated racial and class prejudice and this makes the negative reputation of this phenomenon well deserved.

Bold Liberal Eugenics

According to some bioethicists, classical eugenics is certainly morally wrong, but not because of the initial pursuit of improving the genetic pool of human beings (25); eugenics applications were ethically problematic because, in many cases, they did not leave individuals the possibility of formulating free and autonomous choices. Indeed, the main controversial aspect of eugenics was not considering rights, preferences and wishes of the individuals involved. On the contrary, some forms of genetic selection and genetic treatments currently available, or that will be available in the future, are morally defensible even though they share common traits with the eugenics movement. From this perspective, the social and cultural context of western democracies promotes the autonomy of individuals who are guided in their choices by their own view of the good: for instance, a couple may wish to have a child without Tay-Sachs or sickle-cell anemia and at the same time desire for it a specific eye or hair color. These choices would not be imposed by a third party but would be the result of a parents' free choice.

Enhancing the offspring through of germline modification could be considered morally appropriate if and only if the parents' decisions are free from impositions of the State. Allowing parents to choose the eye color or to enhance mathematical intelligence of their progeny should be morally on a par with allowing parents to teach their children certain religious values or force them to learn to play the piano. Therefore, a genetic change or an environmental influence, such as education, would have the same moral weight if they led to the same ends and had the same degree of desirability. In line with these arguments, Robert Nozick, within his philosophical theory of "minimal state", proposed a "genetic supermarket" allowing parents to design their children: "this supermarket system has the great virtue that it involves no centralized decision fixing the future humane type(s)" (26).

Moderate Liberal Eugenics

However, the promotion of parental procreative autonomy does not always make eugenics free from controversy. The advocate of a milder view of liberal eugenics, Nicholas Agar, states that not every type of genetic reproductive treatment should be considered ethically appropriate (27). In fact, such interventions could compromise the child's right to an open future. In other words, suppose a deaf couple would like to have a deaf child and a new genetic technology that enables the modification of early embryos to make them affected by permanent deafness is available; the couple does not conceive deafness as a physical impairment but as a sort of cultural identity that would guarantee a life experience as rich as that of a non-deaf individual. Instead, according to Agar, deafness would compromise a considerable number of opportunity for the future individual's life plan; such a restriction to the freedom of offspring is quite controversial, thus genetic treatments for this purpose should be prohibited. In general, treatments considered ethically appropriate should be only those that do not exclude life plans based on conceptions of the good life radically opposed to the parents' view. This is recommended because some parents' wishes could convey the prejudices of a certain historical age: John Mackie in this regard states: "*If the Victorians had been able to use genetic engineering, they would have made us more pious and patriotic*"(28). Sticking to my previous example, since the deaf couple's son will not be able to totally distance him or herself from the situation imposed by the parents, a germline modification aimed at intentionally imposing a trait such as deafness is not ethically appropriate. On the other hand, the enhancement of intelligence or of other functions which grant the future individual an increase in the opportunities for the realization of her life plan, could be considered morally defensible.

Habermas and the self-understanding of human nature

Liberal Eugenics is strongly criticized by Jürgen Habermas in his book *The future of human nature*. According to Habermas, genetic engineering blurs the dividing line between the nature *we are* and the organic equipment *we give* to ourselves. He affirms that there is a difficulty in distinguishing between negative and positive genetics, i.e., between the elimination of diseases and the enhancement of human abilities; within this context, liberal eugenics advocates deny to individuate a clear boundary according to the notion of illness and they preferer renouncing any limitation, promoting individual choice and market rules. This perspective is concerning because genetic engineering interventions that overcome the boundaries of therapeutic aims may undermine our ethical self-understanding as members of the human species and affect the self-understanding of a genetically programmed person (29).

The whole point of Habermas's critique is that liberal eugenics would compromise individual autonomy and equality between generations. Any form of genetic enhancement would disturb the moral self-understanding of the new individual who would no longer be able to conceive herself as an autonomous person, namely, the author and the responsible subject of her own life. In fact, the genetically modified individual would no longer have the possibility to consider herself as the undivided author of the her own life's conduct. As a result, she would not even have the possibility of being considered responsible for it. She would share the responsibility for her conduct with a third person who changed her genetic pool before her birth: hence, the programmed person could not conceive the programmer's intention as a natural casual fact. This could generate a sort of alienation from herself (29).

Furthermore, human dignity, conceived as the symmetry of the relations between human beings in which they recognize themselves as equal, would be violated. According to Habermas, dignity is not a quality that humans possess by nature, such as intelligence or eye color; on the contrary, dignity exists only within a community of moral beings who give themselves laws to all the relationships they have (29). As a consequence, liberal eugenics would not compromise only the self-understanding and the moral agency of the programmed person; it would also give rise to an asymmetrical interpersonal relationship that would jeopardize the possibility for human beings to conceive

themselves as equal. Under normal circumstances, the social difference between child and parent, over the generations, is continuously cancelled with the growth of children; instead, the genetic dependence of a modified child by her parents establishes a social relationship that compromises the normal reciprocity of subjects who are equal in their moral value.

It could be noted that, with regard to the ethical autonomy to lead one's own life, the situations of the modified and the unmodified person are not so different: both never have the freedom to choose their genetic heritage which is configured as a given. However, Habermas states that the genetic programming of certain physical and psychical qualities raises critical issues to the extent that it fixes the modified individual to a certain life plan which is chosen by parents. From this perspective, the liberal analogy between genetically modifying a child and shaping it through education is not consistent; in fact, in the latter case, the child-student can always take a critical distance from the socialization process, making herself free in a retroactively perspective. Contrarily, genetic manipulations cannot be corrected ex-post: so a "critical self-(re) appropriation" by the individual is not feasible and no revisionist learning process is allowed. In this context, genetic engineering would promote a sort of unacceptable instrumentalization of human beings: the individual would not be considered as an end in itself, in the sense that he would not be considered the author of a conduct of life-oriented by its own claims.

In conclusion, according to Habermas, any positive eugenics interventions, such as PGD (Preimplantation genetic diagnosis) for non-medical reasons and germline genome editing treatments aimed to enhance the future child's characteristics, should not be allowed. However, this does not mean that every genetic treatments should be forbidden; indeed, with regard to genetic treatments for undoubtedly serious and universally recognized diseases, on which we can assume an implicit consent of the future individuals, Habermas considers such interventions legitimate. Furthermore, pre-implantation diagnosis for hereditary diseases imposing extreme suffering could also be considered ethically appropriate.

A reply to Habermas

Habermas seems to support the thesis that there are conclusive moral reasons against genetic enhancement; hence any genetic enhancement treatments should be considered illegitimate. However, this approach raises some objections. According to Allen Buchanan, Habermas provides no explanation of why a person who develops from a modified embryo *should* conceive herself or *should be conceived* by others as less free than other persons (30). That would be true if and only if germline genome editing rendered that individual incapable of living autonomously. As long as the genetic design does not destroy the biological basis for the individual developing in a being with the capacity for autonomy, the individual can be the "author" of her own life. This does not exclude that modified individuals can *still consider themselves morally different* from the unmodified individuals, or be considered morally different from those who are not modified. However, this is an empirical psychological prediction, not an obvious truth, and Habermas provides no argument in this regard. In addition, some psychological studies seem to show that Habermas' predictions are empirically false (31, 32): these pieces of research suggest that there is no negative effect on the psychological development of a child born after PGD for non-medical reasons compared to a naturally conceived child. Moreover, according to Julian Savulescu, even in cases of sex selection, children seem not to show signs of negative effects (33).

Habermas' argument according to which the genetically modified individual would be fixed to a certain life plan (FLPA) is particularly effective in reference to the bold liberal eugenics perspective, i.e., the position maintaining that parents should be allowed to decide privately any genetic modifications on embryos of their progeny without any limitations. However, Habermas' critiques become less effective with respect to the moderate position, where parents would have the possibility to modify progeny, yet not in complete discretion. Although Habermas' arguments are efficacious to several and bold genetic modifications, it does not follow that others genetic enhancements on progeny are ethically questionable.

In addition, it should be pointed out that fixing the future individual to a certain life plan does not

mean undermining her autonomy. The FLPA should be considered ethically relevant regardless of the validity or otherwise of the argument according to which genetic enhancement would compromise the autonomy of the future individual. FLPA is consistent with Buchanan's view according to which both a manipulated individual and an individual generated without genetic manipulation would have a genome that is given and not chosen: in this context, both individuals have the same biological basis to be autonomous. Regardless of this, the attempt made by parents to intentionally tie the future individual to a given life plan, should be considered ethically questionable. To clarify this point, let us hypothetically consider an embryo that is modified in order to become the new genius of classical music: the individual derived from this embryo is surely autonomous, free to make life choices as indeed was Beethoven whose genome was certainly not modified; however, by manipulating that embryo, parents have made the future individual more inclined to classical music, thus predisposing her to a certain life plan. We cannot deny that our physical and psychical features shape our choices and our life plans, albeit not univocally. In our example, the individual who is manipulated to become the new genius of classical music at some point in his existence could "feel" a kind of affinity with classical music; being gratified by this, she could approach the world of music. In fact, there is a reasonable likelihood that a person who has an attitude for some activities is gratified in practicing them. On the other hand, it is unlikely that a person who has no talent for some activities finds in them a life plan or a great passion: human beings tend to pursue more frequently the activities that best suit their aptitudes. Additionally, being aware of the genome modification of the child and wanting for the child a specific life plan as a classical musician, parents would encourage the child to undertake the study of classical music; this would, even more, push the individual towards a future chosen by parents. In short, the fact that the autonomy of the enhanced individual is not harmed does not enable parents to carry out genetic interventions in full discretion. By fixing the offspring to a specific life plan, parents would consider their future son as a mere mean and not as an end in herself. However, this argument is insufficient to advocate an unconditional rejection of every form of genetic enhancement. In fact, providing the offspring with a greater nonspecific intelligence, which does not fix the individual to a specific life plan, would not seem a form of instrumentalization. On the contrary, providing a specific predisposition to classical music should be considered ethically questionable.

Michael Sandel: Mastery and Gift

Another prominent argument against enhancement is proposed by Michael Sandel in *The Case Against Perfection*. According to Sandel the core problem with genetic enhancement is the drive to mastery: "*what the drive to mastery misses, and may even destroy, is an appreciation of the gifted character of human powers and achievements*" (34). Eugenics and genetic enhancement, in fact, represent an unilateral triumph of wills over natural gifts, of domination over reverence, of modeling over contemplation. The Promethean impulse of domination pushes the individual to redesign nature, losing the capacity to accept human life as a natural gift. The urge to program and cancel the contingencies through genetic engineering corrupts parenthood as a social practice governed by rules of unconditional love. From this perspective, the maternal and paternal affection should not depend on talents and traits that the child possesses but on "an openness to the unbidden", that is a quality of character that restrains the impulse to mastery and control over progeny (34). As William May points out, parental love has two aspects: accepting love and transforming love. Accepting love affirms the being of the child, whereas transforming love seeks the wellbeing of the child: each side of parental love corrects the excesses of the other (35). However, according to Sandel, the balance between the two forms of love is undermined by genetic engineering. Furthermore, eroding the consideration of the sense of giftedness, genetic enhancement treatments could lead to a change of key terms of our moral vocabulary, namely, humility, responsibility, and solidarity (34). Firstly, if people became accustomed to genetic enhancement, the social foundation of humility would be weakened: that is because only the awareness that talent and skill are not entirely dependent on human beings, but also depend in part on chance, can reduce their propen-

sity to *hybris*. Secondly, genetic enhancement could imply an increase in parental responsibility: parents would be responsible for having chosen or not chosen the characteristics of their children and this would call for a moral overload. Such a scenario could lead to the misuse of genetic testing or to the stigmatization of non-enhanced or disabled individuals. Finally, genetic enhancements would make it more difficult to cultivate the moral sentiment of social solidarity. Conceiving talents as fruits of fate, the individual will be more inclined to share the results obtained with people who, without their fault, do not have the same talents. The awareness that no one is fully responsible for her own success saves the meritocratic society from the comfortable certainty that success is the reward of virtue and that the rich are rich because they are more deserving than the poor: no longer offset by chance, meritocracy would become more severe and less understanding. Thus, the absolute control of the genome, according to Sandel, would undermine the solidarity that arises when men and women reflect on the casual character of their talent and their lucks.

A reply to Sandel

It is reasonable to say that also Sandel fails to offer a satisfactory argument against all forms of genetic enhancement. Firstly, according to John Harris, the concept of giftedness in quite controversial: in fact, it is not clear why we have to recognize and accept the gifted nature of normalcy but not the gifted nature of disease (36). Sandel could answer to this critiques affirming that medical intervention to cure or prevent illness, or restore the injured to health does not undermine the concept of life as a gift because it does not desecrate nature but honors it (34); by contrast, genetic enhancements would be considered as a form of hubris of the designing parents, in their drive to master the mystery of birth. By using the aforementioned expression of "openness to the unbidden", Sandel thus maintains that this is good when it is part of a non-disfiguring relationship between parent and child. However, he does not provide any convincing reason to ground this statement but only rhetoric reasoning (36), since Sandel does not give any reasonable criteria to draw the ethical distinction between therapy and enhancement: Harris suggests that there is a continuum between treating dysfunction and enhancing function which invites us to consider the benevolent motives and life-enhancing outcomes of both. (37).

Secondly, even assuming the sense of giftedness as a central human good, parents might want to genetically enhance their future son without having an impulse to mastery. For example, an increasing lifespan enhancement would not hide any inclination to dominate others and the sense of giftedness would seem preserved. Furthermore, for a hypothetical future individual who is potentially able to live much longer, more than anyone else, there would still be plenty of things to sustain the sense of giftedness. In fact, with Buchanan we can say that enhanced people would still die of accidents; wars presumably would still occur even though many of us would not want them to; deadly pandemics presumably would still arise, despite our best efforts to avoid them; people would still fall in love with people who do not love them and fail in every effort to make themselves loveable (30). These considerations seem to suggest that humility, responsibility, and solidarity would not be incompatible with every forms of genetic enhancement. However, it's reasonable affirming that seeking boundless enhancement exhibiting an impulse of domination incompatible with good human life should be considered a negative idea. There is no doubt that, at a certain point, the desire for a perfect child could corrupt the parents' virtue to still be open to welcoming others. Nevertheless, it seems difficult to argue that this concern provides a decisive reason against any form of enhancement.

General considerations on enhancement

Bearing in mind the above considerations, we can affirm that Habermas' and Sandel's arguments fail to provide a conclusive reason for rejecting genetic enhancement altogether. However, at the same time, we can take the recommendation of these arguments to formulate a neither too permissive nor too restrictive approach on genetic enhancement. In fact, as I said, some of the fears expressed by these two prominent philosophers are reasonable and noteworthy. As a

consequence, we should adopt a view that evaluates the pros and cons or the risks and benefits of various forms of genetic enhancement through a case by case analysis. This view does not assume any kind of consequentialist or utilitarian outlook. It states that it is appropriate to take all considerations into account, not only with respect to the consequences but also with regard to a deontological perspective. Such an approach is quite similar to what Buchanan calls "Balancing view"(30). In order to support this approach, we need to redirect the ethics of enhancement by abandoning the questionable framing assumptions regarding a distinction between historical improvements and genetic enhancement.

Enhancement is here defined as the set of techniques aimed at improving certain abilities and functions over the normal human range. Therefore, enhancing human beings means allowing them to do what normal beings are not able to do. In these terms, we should note that enhancement cannot be limited to the genetic context but is omnipresent in human history. In fact, literacy and numeracy are among the most important cognitive enhancements: for example, literacy increases our cognitive abilities, allows us to understand the past through reading written archives and increases not only the mnemonic capacity but also the ability to reflect on our experiences and to give them meaning (30). From this perspective, historical improvements, even if they cannot be conceived as "genetic", must also be intended as forms of enhancement of human beings. Hence, there is no reason to believe that genetic enhancements are morally more problematic than historical ones.

The problematic aspect of enhancement is not in the enhancement in itself but in the ways in which enhancement is achieved. Indeed, enhancement treatments could be imposed on individuals who do not desire to receive them and this would compromise their autonomy. Furthermore, some enhancements could lead to situations of social injustice, inequality and discrimination of non-enhanced individuals: as Daniel Wikler notes, both classical eugenics and liberal eugenics raise important questions of justice with reference to the possible distortions of equity caused by the advantage gained to individuals through some improvements (25). This is why enhancement, both in the historical sense and in the genetic (or biomedical) sense, must not be rejected in itself. A balanced view is appropriate to evaluate case by case the ethical appropriateness of the specific types of genetic enhancements.

In light of these considerations, we can say that genome editing for enhancing progeny is morally appropriate to the extent that these treatments respect the principle of non-maleficence and the principle of non-instrumentalization of future individuals, and the principle of justice so that it does not create or exacerbate social divisions or unjustified inequalities in society. Consequently, Liberal Eugenics, especially in the more extreme formulations, should be rejected: even though the liberal eugenics argument is appealing because it promotes procreative autonomy of parents and refuses a specific "genetic ideal" promoted by the State, some genetic enhancing treatments might undermine the principles mentioned above.

Back to the Slippery Slope

It is worth repeating the undesirability of a slip toward an eugenics scenario in its classical sense: the eugenics movement, during the 1870-1950 period, perpetrated repeated violations of human rights, promoting ideologies such as classism and racism and violating the dignity of the human being. Actually, the return to classical eugenics seems unlikely. More precisely, a scenario in which human rights are continually compromised by coercive actions and by racial and class discrimination seems improbable. After the Second World War, western states paid great attention to human rights. Due to the atrocities committed by Nazi Germany, the centrality of the dignity and respect of the individual was reiterated in the "Universal Declaration of Human Rights" of 1948 (38). Furthermore, the spread of democratic values in the West and western Europe has changed the relationship between society and the individual: nowadays, a coercive intervention of society on citizens' body is considered inadmissible and every medical intervention, not only experimental but also therapeutic, is bound by informed consent (39). In addition, the disability, homosexual and ethnic minorities' rights movements have made

enormous progresses in promoting greater awareness of such rights among institutions and public opinion since the second half of the twentieth century (40). Hence, there is a reasonable likelihood that permitting germline genome editing would not compromise the principles mentioned above to such an extent that this scenario is again realized. The historical assumptions of classical eugenics cannot be found in the mainstream thinking of contemporary western society and for this reason it can reasonably be argued that a similar movement cannot recur.

Nevertheless, in some regions of the world, ideological prejudices such as racism, nationalism, and classism are still widespread and, in this context, the regulation of new practices that improve the gene pool of the unborn child will have to be carefully analyzed.

Although a return to classical eugenics would be considered not likely to happen, supporting the possibility of a slide towards liberal eugenics seems instead more plausible. Indeed, accepting germline genome editing would pave the way to a future scenario in which it would be conceived morally acceptable to "shape" and enhance future individuals based on the parents' personal choices and wishes. The socio-cultural context may suggest the possibility of a progressive social acceptance of the perspective described above: the principles of procreative autonomy and pluralism, which are the basis of the liberal view, are widely recognized within western contemporary societies. Although we conceive sex selection for non-medical reasons as a negative selection, this practice is widely accepted from a moral standpoint by people in the countries where it is legally allowed; acceptance of other forms of genetic enhancement could, therefore, occur easily as soon as the technology reaches a sufficient level of progress. Furthermore, Sandel notes that contemporary American society already embodies some tendency to the exploitation of children who are subject to the wishes of their parents: the latter often demand too much effort from their offspring in sports and the school context (34). In line with Sandel's statement, Natalie Colaneri and colleagues observe that the diagnosis of attention disorders has increased dramatically over the last 20 years. According to the authors, this may be ascribed to an ambiguity of the diagnosis due to an unclear distinction between therapy and enhancement and, above all, high parental expectations of their children and the parents' way of conceiving of their style of parenting (41, 42). Due to the practical possibility of adhering to unlimited genetic enhancements, there is a plausible likelihood that they will be accepted inaugurating "a genetic supermarket" aimed at achieving the most disparate wishes of parents. Hence, the uncritical acceptance of germline modification would lead to the actual risk of a gradual acceptance of practices that could compromise the principles of justice, non-instrumentalization, and non-maleficence towards offspring. Nevertheless, I believe that there is a strategy for admitting germline genome editing treatments in order to enjoy the unquestionable advantages of this practice, without necessarily sliding towards an undesirable perspective.

Avoiding slippery slope argument: a proposal

The strategy here proposed stands in stark contrast to the libertarian perspective according to which genome editing, both in therapeutic and enhancing applications, should be regulated by purely market dynamics. However, it also rejects models that would allow only therapeutic interventions and prohibit all forms of enhancement.

I support a strategy that consists in admitting, as well as therapeutic interventions, some parental requests to genetically enhance their progeny. In order to be considered legitimate, genetic enhancement treatments should respect the following criteria: a) they must not conflict with the interests and well-being of the future individual (principle of non-maleficence); b) they must not violate the principle of non-instrumentalization of offspring (principle of non-instrumentalization); c) they must not generate unjustified inequalities or undermine access to any social positions for other non-enhanced individuals (principle of justice).

However, it could be reasonably objected here that in this way the SSA in its empirical version is not avoided at all. Allowing, at first, certain enhancements could lead to a scenario in which many other enhancements would eventually be allowed, thus ending up in accepting the perspective of liberal eugenics. This strategy would not provide any conceptual distinction and effective methods to avoid the possibility of a psy-

cho-social acceptance of an undesirable scenario. To guarantee the purposes of the strategy, and at the same time avoid to slipping "down to the slope", it is appropriate to set up an *advisory and authorization body*: its main purpose would be to assess which enhancements are legitimate and which are to be considered inappropriate, through a case-by-case analysis.

With the aim of developing this proposal more comprehensively, I briefly recall the case of the Human Fertilization and Embryology Authority (HFE Authority). The latter is a public body of the United Kingdom Department of Health which regulates *in vitro* fertilization practices, artificial insemination, gamete and embryo cryo-conservation, and human embryo research. This body includes not only doctors, researchers, scientists but also economists, jurists, bioethicists, religious authorities, and individuals who report personal experiences in the area of assisted reproduction. Established in 1990, the HFE Authority has the task of supervising and regulating medical treatments associated with technological developments in this field (43). Therefore, it is not a matter of entrusting to a body only the implementation and monitoring of the legislative requirements; HFEA has the power to regulate in good part the medical treatments associated with technological developments in the sector (44). The institution of such authority not only makes laws (and ethical and social considerations) suitable for a field of medicine subject to rapid changes but also allows a case-by-case approach to evaluate the interests at stake (45). Parents make requests to the HFE Authority; the requests are analyzed by a committee which can provide or deny authorization to the requested practice. In the context of genetic interventions, I support an authorization model that is in contrast to the laissez-faire regime that characterizes liberal eugenics, which subordinates all interests to the principle of parental procreative autonomy. An example of HFE Authority work is the case of Nicole Maserton's parents, a 3-year-old girl who died in an accident. Shortly after her death, parents contacted the HFE Authority to be allowed to use PGD in order to select a female embryo. Already having four male sons, they wanted to "rebuild the female dimension" of the family. In this case, the HFE Authority did not authorize the request, because it did not consider the practice of sexual selection acceptable for purposes other than that of avoiding genetic disorders (46).

The HFE Authority experience is significant to face the issue of genetic treatments and enhancements of progeny. From this perspective, the authorizing body should examine the parents' requests for enhancing children and evaluate their compliance with the principles of non-maleficence, non-instrumentalization, and justice. Moreover, the possible social consequences resulting from the authorization body's decisions should be considered. The authorization body should also provide support and consultancy service (47) to couples intending to enhance their future children: in this way, it would promote the parents' autonomy to decide in a fully informed way but also consider and guarantee the interest of future individuals and society. Additionally, such a committee should guarantee equity among society avoiding social division and unjustified inequality.

Conclusions

It has been argued that the SSA, in its empirical formulation, cannot always be rejected. Indeed, convincing arguments exist in order to show that admitting certain genetic manipulation practices may lead to the acceptance of inappropriate interventions. However, it is wrong to deduce that the general prohibition of germline genome editing is the only way forward. In my opinion, the strategy proposed offers a reasonable embankment to the slide towards liberal eugenics. The Authorization model appears convincing because it would allow greater procreative autonomy and would promote a reasonable control in the field of human genetic enhancement, which inevitably harbors significant risks. While a general prohibition appears unjustified, an excessive form of laissez-faire could lead to the progressive acceptance of a scenario in which the principles of justice, non-maleficence and non-instrumentalization would be continually violated, making genetic interventions ethically unacceptable and not desirable. In light of this, the establishment of a body composed by experts who assess the ethical and social appropriateness of the individual enhancement cases is a strategy that deserves to be taken into account in new genome-editing techniques' debate.

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