AN ARGUMENT IN FAVOR OF HUMAN GENETIC ENHANCEMENT

by

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Abstract

Human Genetic Enhancement (HGE) has the potential to provide great benefits to a large number of people in terms of alleviating inherited disease and disability and maximizing individual liberty. There are many arguments against research and application of this new technology based on a variety of grounds, including both deontological and consequentialist objections. In this thesis I examine arguments from both of these positions and argue that neither offers a satisfactory justification for prohibiting research into HGE nor do they demonstrate that the application of the knowledge gained from such research is necessarily wrong. I also suggest that there is a strong argument in favor of HGE in that it may offer a way to reduce the amount of disadvantage currently present in our society as a result of genetic disease and disability by addressing the genetic causes of these conditions. Further, I argue that the pursuit of HGE is necessary in order to promote individual liberty and promote equality of opportunity. Finally, I argue that by examining principles that require us to promote individual liberty we can establish the categories of enhancements which we should publicly fund and those that should merely be permissible.
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# Table of Contents

Abstract ............................................................................................................................................ ii  
Acknowledgements ......................................................................................................................... iii  
Table of Contents ............................................................................................................................ iv  
Chapter 1 Genetic Enhancement and the Obligation From Justice to Enhance ......................... 1  
Chapter 2 Deontological Arguments Regarding Enhancement .................................................... 17  
Chapter 3 Consequentialist Objections to Genetic Enhancement ........................................... 37  
Chapter 4 Personal liberty and Human Enhancement .............................................................. 59  
Bibliography ...................................................................................................................................... 70
Chapter 1

Genetic Enhancement and the Obligation From Justice to Enhance

In 2000 Celera Genomics\(^1\) announced the completion of the project of sequencing the human genome. While the data acquired through this project is still being analyzed, the impact of the completion of the initial stages of the project should not be underestimated. More recently, on the 3rd of September 2007 the J. Craig Venter Institute\(^2\) (JCVI) along with several other research groups announced that they had successfully mapped the DNA sequence of a specific individual.\(^3\) Whereas the previous sequence had “merely” recorded the data from a collated pattern of DNA from several donors, the new sequence is from one individual and shows that chromosomal variation between individuals is much greater than had previously been supposed. By providing an insight into the genome of a specific individual, this research demonstrates the possibility of using information about an individual’s genotype to provide an unprecedented level of diagnosis of genetic vulnerabilities to disease, in turn enabling genetic medical treatments to be tailored to specific individuals. According to the JCVI, the completion of this project “ushers in the era of individualized genome-based medicine”\(^4\) as it demonstrates a

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more thorough understanding of the DNA of specific individuals.\(^5\) Purely in terms of awareness of the new wave of technology, these projects demonstrate that the genomic revolution is not only a possibility but that it is already happening and its effects may be huge. This possibility motivates my discussion of the ethical status of pharmacogenomics in the following chapters.

The sequencing of the Human Genome is perhaps less startling when we consider the various other paradigm shifts in reproductive and health technology that science has made available to us. The birth of the first “test tube baby”, Louise Brown in 1977\(^6\) appears to be no less fantastic when considering the astounding departure from previously existing medical and scientific capability. However, while the emergence of new reproductive technologies marked a new departure for human reproduction, the accomplishments of Celera genomics, the JCVI and the Human Genome Project (HGP) mark the start of an entirely new phase of human development, one where it may be possible to determine exactly what kinds of organism will be produced by various methods of reproduction.

In this paper I take human genetic enhancement to include all technologies which may be used to affect the way in which a specific individual’s genome is expressed. This includes

\(^5\) While valuable, an individual human genome is meaningless without knowledge of genetic sequences of populations to compare it with.

embryo selection on genetic grounds and direct genetic intervention, or “genetic surgery”, performed on an embryo or fetus, designed to remove those genes which will cause disease or disability or to augment or enhance the child’s existing genotype. This paper focuses on the pharmacogenomic aspects of human genetic enhancement and as such is concerned with direct intervention on the genomes of individuals. However, while the main focus of this paper is on treatment and enhancement, I also briefly consider the ethical status of the other applications of genetic science, such as human cloning and preconception gender selection (PGS) as these technologies have faced objections similar to those leveled at HGE.

HGE may be used to make people more resistant to disease, longer lived and to have greater cognitive abilities. It may also be used to cosmetically alter individual children so as to fit with a specific aesthetic ideal. In this way, genetic intervention may be used to address both medical and aesthetic concerns at a genetic level. I address both of these issues throughout this paper with the main discussion of these two applications of genetic technology occurring in chapter four.

In this paper, I examine the objections to human genetic enhancement (HGE) and argue that rather than presenting a definitive set of reasons why HGE technology and research

\[7\] The distinction between treatment and enhancement is not helpful here as it extremely unclear where the boundaries for these categories are. For example, an individual who is genetically predisposed to having cancer and who receives a genetic intervention to remove it may well be classified as being both treated and enhanced without contradiction.
should not be pursued, bio-luddites merely demonstrate areas of concern for policy makers. I also argue that the pursuit of enhancement technology is required by equality of opportunity and individual liberty. As such, certain enhancements which become possible should be available to all individuals in the same way as access to medicine and health care. In this way it can be seen that access to HGE is not merely a question of freedom of individual choice, but that it has wider connotations for principles of justice.\footnote{Allen Buchanan et al., \textit{From Chance to Choice: Genetics and Justice} (New York NY: Cambridge University Press, 2000), 309-315.}

Given the perceived potential effects of genomic research carried out by organizations such as the JCVI and the HGP it is not surprising that concerns have been raised as to the ethical status of genetic enhancement of human beings.\footnote{Emy Lucassen, “The Ethics of Genetic Engineering,” \textit{Journal of Applied Philosophy} 13 (1996): 51-62.} The debate on HGE and research is wide ranging, covering many aspects of philosophical debate, and it is increasingly relevant to society. As technology advances, new vistas of possibility are opening up and practices which may previously have seemed like science fiction are either currently in use or are looking ever more likely. The question, in its simplest form, is no longer whether we will be able to enhance humans, but whether we should\footnote{Julian Savulescu, “Procreative Beneficence: Why We Should Select the Best Children,” \textit{Bioethics} 15(2001): 413-426.} when we can.

\footnote{Allen Buchanan et al., \textit{From Chance to Choice: Genetics and Justice} (New York NY: Cambridge University Press, 2000), 309-315.}
\footnote{Julian Savulescu, “Procreative Beneficence: Why We Should Select the Best Children,” \textit{Bioethics} 15(2001): 413-426.}
The Debate

In very general terms the debate over the ethical status of HGE can be categorized in terms of two main positions; Transhumanism and Bio-luddism. The latter group, as may be obvious from the name, is opposed to HGE, while the former are broadly in favor of genetic research and the possible enhancements that may arise from it. In this introduction I outline the various positions within these two main camps and explain the position from which I approach the issue of the ethical significance of HGE. I also provide a brief overview of the main areas of philosophical conflict between these two conflicting positions and outline the areas of discourse that will be covered in the later chapters of this paper.

What is unusual about the division between Transhumanists and Bio-luddites is that rather than finding its base on traditional political grounds, conservative and progressive thinkers may be found on either side of the divide. In his book Citizen Cyborg, James Hughes outlines the main distinctions that may be drawn between these different groups and offers a very useful dissection of the various positions that lead to these strange alliances. Broadly speaking, however, it is possible to define the two groups in terms of

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13 I have taken the term “Bio-luddism” from James Hughes book, *Citizen Cyborg*; op.cit. As such it is likely that it is a term not widely acknowledged by those who would find themselves in this category. However, as a name for a very broad category of opposition to enhancement it is a useful term, despite its derogatory connotations.
either pessimism or optimism about the effects of HGE, though this is, of course, no more than a very general and incomplete picture of the two groups. Hughes argues that as well as the traditional two-dimensional distinction between conservative and progressive, with economic and cultural policy acting as the indicators of political stance, the advent of new technologies provides a third dimension to political identification, as I discuss below. The bio-luddite stance can be seen as arising from a broadly pessimistic view of the consequences of the development of human genetic technology; as a result this stance is broadly conservative. However, this conservative stance does also attract many traditionally progressive individuals who are concerned about the social impact of HGE. Indeed, it is partly for this reason that the term “bio-luddite” is more appropriate than “bio-conservative”¹⁴ as the former adequately refers to both political stances within the broad group opposed to genetic enhancement.

**Bio-Luddism**

Conservative bio-luddism focuses on issues relating to human dignity and the significance of essential human characteristics. While the majority of conservative bio-luddites base their arguments on religious grounds there is also considerable support from secular philosophers such as Francis Fukuyama¹⁵ and Leon Kass. A central argument within the bio-conservative agenda revolves around a very specific definition of what it means to be worthy of moral consideration - which Hughes classifies as “human

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¹⁴ However, I do use the term “bio-conservatives” when referring to conservative bio luddites as this accurately describes this specific sub group of the broader category of bio-luddites.
racism”, a concept which I explore in greater detail in the following chapter. It is perhaps unsurprising given the religious foundation of much of bio-conservative thought, that many bio-conservatives have also opposed other forms of reproductive technology. For example, Leon Kass, the bio-conservative former chair of the President’s Council on Bioethics has stated his opposition to all kinds of human cloning, including that used to produce stem cells for research, and to birth control medication. In the case of the former he makes the argument that such technologies exploit “nascent human life” and in the latter case he proclaims that the use of the birth control pill contradicts a woman’s “natural maternal destiny”.

At the opposite end of the political spectrum of bio-luddism are the liberal opponents of HGE. Rather than focusing on issues relating to the limits of who may be called human, liberal opponents of HGE are primarily concerned with the possible negative consequences of genetic research. These concerns are primarily directed at the potentially stratifying effects that HGE could have on society, both in creating a new “genetically superior” social class of trans- or post-humans, and in terms of the potential further

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stigmatization of existing marginalized groups. Advocates for left bio-luddism can also be seen to primarily be concerned with ensuring the maintenance of an equal and equitable society and are concerned that the creation of a new genetic class will have a negative effect on existing citizens. Examples of the arguments used include the fear of discrimination against the unenhanced, the further stigmatization of people with disabilities,21 questions of personal identity of so called “designer babies”,22 commodification of individuals,23 particularly children, and the widening of the gap between rich and poor.

These are serious concerns; they will therefore form a large part of the focus of this paper. While I examine these issues in detail, I argue, contrary to liberal bio-luddites, that while HGE presents several concerns which should be discussed, the possible benefits from HGE justify taking a small risk in order to provide larger benefits to a current and future generations of people. A final concern is related to the massive cost of research aiming to develop these new technologies when there is arguably not enough governmental spending on existing basic health care. This issue presents two questions, the first arising from the diversion of funding to research into HGE. Such a diversion arguably limits the available resources for conventional health care provision to patients if the health care delivery budget remains constant in relative terms. The second question

concerns the issue of whether research into HGE should be prioritized over research into conventional medicine. This argument is subtly different from the others as it focuses less on the potentially stratifying effects of HGE and more on the immediate negative consequences of failing to provide adequate funding for health care.

It is obvious that the bio-luddite position is broad. However, two main themes can be seen within the position: firstly, the bio-conservative position of human essentialism makes use of traditional “playing God” arguments and is less concerned with the consequences of HGE. Secondly, the liberal bio-luddite position is almost exclusively concerned with the consequences of HGE and focuses on social discrimination and possible negative consequences of enhancement technology. The bio-conservative position can therefore be seen to arise from objections to the principle of HGE whereas the concerns of liberal bio-luddites are based on concerns over the possible consequences of enhancement technology. Therefore, it is possible that the latter can be dealt with through appropriate methods of regulation, whereas objections raised by bio-conservatives will persist despite any regulatory steps short of a full ban on HGE.

It is perhaps ironic that these two positions have found themselves in alliance with one another as they represent traditionally antagonistic political ideologies. However, as James Hughes has argued, it does appear as if new technology will reshape the political landscape at least in the near future.24
My own position is based on similar philosophical principles to both that of liberal bio-luddites and libertarian transhumanists. Indeed, the main objections which arise from liberal bio-luddism are based on concerns about the possible negative consequences of HGE rather than an objection to the principle of enhancement. As a result our positions are similar, as I am also concerned with ensuring that HGE does not have the negative consequences discussed elsewhere in this Introduction. However, while the liberal bio-luddite focuses mainly on the negative consequences of HGE, such as discrimination and social stratification, my own position is broader. I am also concerned with the harms caused by disease, disability and the gradual deterioration of physical and mental function caused by aging, as well as the potential social inequalities caused by these issues. As a result, my discussion of potential HGE policy focuses on the potential harms it may alleviate as well as those it may cause.

**Transhumanism**

Thoughts on HGE are equally divided on the optimistic side of the debate, with the divide centering on the appropriate level of regulation of new technologies. On the right of the Transhumanist camp are libertarian transhumanists who are in favor of unregulated enhancement technologies and focus specifically on the individual’s right to choose enhancement for themselves or their offspring.²⁵ As the name suggests libertarian

transhumanist thought tends to be economically conservative and culturally progressive, with emphasis placed on individual rights and freedoms. *The Extropian Principles*,²⁶ by Max More, an early libertarian transhumanist, demonstrates this focus on the freedom of the individual to pursue their own development “from human to a transhuman or posthuman condition”.


²⁷ Ibid. (accessed 2nd May 2008).


A notable feature of the Extropian philosophy on HGE, which is common to one extent or another across transhumanist thought, is the belief that certain allegedly inherent features of humanity such as disease and death are not inevitable and should be the focus of research in order to allow such conditions to be removed from the “human condition”. It is also a central tenet of libertarian transhumanist thought that the continuation of technological development is inevitable and as such, any attempt to regulate or limit development will be counterproductive. Therefore, the appropriate course of action will be to allow totally free and unrestricted access to enhancements of any kind.

In contrast to the libertarian transhumanist movement, democratic transhumanism²⁸ focuses on more egalitarian principles of distributive justice and attempts to address concerns raised by liberal bio-luddites. The focus here is on the need to ensure that any society in which HGE technology is available is equitable and avoids the stigmatization of vulnerable groups. Central to arguments in favor of HGE from a democratic
transhumanist perspective is the idea that not only do individuals have the right to not have their reproductive choices made for them by a paternalistic state; it is in fact a requirement of justice that we encourage research into HGE in order to combat existing inequalities. As I have previously stated, the main point of difference between the libertarian and democratic transhumanist positions lies in determining the legitimate constraints on technological development, with libertarians arguing for minimal regulation in order to allow for the maximization of individual freedom to develop. In contrast, democratic transhumanism argues for regulation of HGE technology in order to combat social inequalities which may arise from deregulated, free market enhancements.

In chapter three I examine the principle of “procreative beneficence” as suggested by Julian Savulescu, who argues that we have an obligation to pursue genetic selection of our offspring if doing so will minimize the occurrence of potentially disadvantaging conditions such as vulnerability to disease. I argue that while there may seem to be problems determining what the appropriate definition of “best” may be, it is possible to address this concern by reference to our understanding of the disvalue of disease and disadvantage. I also examine concerns raised by Inmaculada De Melo-Martin regarding the availability of necessary technology and the potential social impact that its use may

have and argue that as these concerns are based on the possible consequences of HGE rather than objection to the principle involved, they may be met by appropriate regulation.

**Argument**

Throughout this paper, I take as a fundamental principle the idea that being socially (or otherwise) disadvantaged by disease, disability or discrimination is inherently a bad thing. Further, when we are able to eliminate such disadvantages there is a strong moral imperative to do so. While this may seem strongly reminiscent of Peter Singer’s premises in his argument about international aid, my argument does not follow a strictly utilitarian model despite my initial starting premise.

My position on the disvalue of disease and disadvantage is uncontroversial and seems to be a perspective that is almost universally shared. As is argued by Julian Savulescu, we place negative value on disease, disability and disadvantage as evidenced by the existence of medicine, hospitals and other methods of treatment and rehabilitation. If we did not place disvalue on illness and injury we would not develop medical technology to limit their effects and we would not try to maintain our health or avoid injury. While it may be possible to argue that we gain some benefit in terms of personal growth from

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negative events such as disease or injury, we do not and should not seek out such events in order to benefit from them\textsuperscript{34} nor should we leave their occurrence to chance if we can prevent them from occurring.

For example, while it may be argued that having certain characteristics such as a predisposition to acute depression may enable an individual to create magnificent works of art, we would not be justified in selecting or enhancing an individual embryo to have the genes for depression. Further, we should not leave the occurrence of depression to chance on the grounds that they will go on to create such works of art when the condition can be prevented. Doing so treats the individual like an “art machine” and makes the judgment that the works of art they will create are of more importance than the disadvantage imposed on the artist living with depression. While the production of art may contribute somewhat to a pleasurable life for the depressed artist, suffering from acute depression for the sake of this pleasure seems to contradict generally held view of the significant negative impact that acute depression has on the depressed individual.

What are important in the context of HGE are not the labels attached to the causes of disadvantage but the causes themselves. When someone’s quality of life is reduced compared to the norm it does not matter whether it is as a result of disability or disease. Rather, what is important is the disadvantage itself and what can be done in order to maximize the quality of life of the individual and to minimize the disadvantage they face.

\textsuperscript{34} Ibid: 287.
My concern is with the impact that maladaptive conditions have on the subject’s quality of life and the interventions that may be possible in order to limit these effects. HGE offers an extension of contemporary medical technologies and may provide avenues to improve the lives of people with currently untreated conditions.

In this paper, as well as discussing objections to new technologies, I argue that while HGE technology does present some startling new issues to consider, they are a group of technologies which will arguably be of considerable benefit to many people. However, a central concern of this paper is the possibility that enhancement technology will present a new series of methods by which persistent social inequalities will be continued and potentially exacerbated. This is of particular concern as it is possible that the potential consequences of HGE will collectively be more harmful than beneficial. It is as a result of this possibility and my belief in the disvalue of disadvantage that I argue for a thoroughly regulated system of research and enhancement in order to mitigate any potentially harmful consequences which may occur as a result of emerging technologies. Like liberal bio-luddites I recognize the potential risks that unregulated research and enhancement creates, though I am not convinced that these risks offer sufficient reason to forbid research into possible genetic enhancements. Further, even if we accept that these risks are present, I believe it will be possible to minimize the risks that such technologies represent through effective regulation. Just as HGE technology offers a method to prevent avoidable suffering caused by medical problems, technology also offers a way to improve the total equality of opportunity present in society.
In the following chapters I discuss both deontological and consequentialist arguments against the development of HGE technology. I argue that neither of these avenues can adequately justify prohibiting HGE given the potential benefit that it may provide. In the final chapter I provide an argument in favor of HGE and discuss the kind of enhancements which should be publicly as opposed to privately funded.
Chapter 2

Deontological Arguments Regarding Enhancement

The bio-conservative Francis Fukuyama is one of the more vocal opponents to human genetic enhancement (HGE). This chapter focuses on a critique of his position as described in his book *Our Posthuman Future: Consequences of the Biotechnology Revolution*. Other bio-conservative opponents to HGE include Leon Kass and Bill McKibben who argue for similar positions with respect to the normative value of human nature. I argue that the normative value Fukuyama places in human nature is misplaced and does not offer any guidance as to the moral status of HGE. I also argue, contrary to bio-libertarians, that regulation is necessary in order to avoid undesirable consequences of HGE, such as new forms of discrimination and social stratification on genetic grounds.

Fukuyama’s argument against HGE rests on a deontological claim about the normative significance of “human nature”. As such, those technologies which would affect his specific definition of human nature are regarded as harmful and therefore morally unacceptable. Fukuyama’s main argument for the harmfulness of HGE is that human

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nature helps to define our fundamental moral values\(^\text{38}\) and our political structures. As such, any change in human nature could have harmful consequences for individual people and for liberal democracy as a whole.\(^\text{39}\) In this chapter I examine this claim and the underlying assumptions about human nature and its relation to democracy in more detail. I also examine another opposed deontological position; that of bio-libertarians who argue for a genetic free market in opposition to the blanket prohibition on HGE that Fukuyama argues for.

Fukuyama’s position of human genetic essentialism places excessive restrictions on several areas of concern including: personal liberty, definitions of moral personhood and the range of acceptable medical technologies. His position also fails to provide a satisfactory reason for the normative significance of human nature and is victim to the naturalistic fallacy. In addition to Fukuyama’s deontological objections to HGE on natural grounds, he also raises two major objections on the possible consequences of HGE, the issue of behavioral modification through neuropharmacology or genetic intervention and the issue of aging populations. These objections are also problematic for Fukuyama as they lead to worrying conclusions about the ethical status of certain conventional medical treatments, as I discuss below.


\(^{39}\) Ibid: 7.
The Significance of Naturalness

A central tenet of Fukuyama’s argument is that current political structures are based on essential characteristics of human nature. Taking Aristotle’s view that humans are political creatures as generally correct, Fukuyama claims that any fundamental change to our human nature, such as that offered by HGE, presents a serious risk to justice and to our social and political structures.

Fukuyama’s rejection of the naturalistic fallacy is based on the idea that the gap between “is” and “ought” can be bridged by such terms as “wanting”, “needing” or “desiring”. By this he means that if we find something disturbing or otherwise undesirable, we can make a normative claim that it is therefore immoral. Fukuyama argues that we can move from an emotional response such as “I find X disturbing” to the normative claim that X is wrong, by examining our reasons for our emotional response. In such a case our judgment of the normative value of the stimulus is based not on our emotional response, but on our rational evaluation of it. For example, in the case of HGE Fukuyama claims that it is disturbing, and because things which are disturbing frequently turn out to be harmful, and as we do not want to be harmed we should not pursue HGE. While it may seem that this answers the naturalistic fallacy, the subjective nature of our emotional responses is still problematic, as I show in the following section. Further, the objective justifications used to give weight to our emotional responses make those responses redundant as we could instead refer to the “bridging” judgments to provide us with a

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40 Ibid: 164.
normative evaluation of a particular stimulus. If we may use objective reasoning to justify our emotional response we are merely attempting to find an excuse for that response rather than reasoning our way to it. Fukuyama claims we can examine these responses and establish shared moral values based on our empirically accessible emotional responses.42 Fukuyama does acknowledge the subjectivity of emotional responses, however, and recognizes the need to move to an objective basis of moral reasoning, which is possible, he argues, through the universal characteristics of human nature.

**The Wisdom of Repugnance**

Fukuyama’s position is similar to the argument put forward by Leon Kass in his article “The Wisdom of Repugnance”43 where he argues that the repugnance we allegedly feel when discussing certain practices, in this case human cloning, provides guidance as to their moral status. This position is, I think, deeply unsatisfactory and seems to fall victim to exactly the problems associated with other subjectivist theories of morality. It is, first, entirely subjective, seen in the fact that the repugnance of human cloning is not a view shared by all people.44 Indeed, even if Kass’ opinion of HGE as harmful was more or less universally shared this would not mean that this belief was true. I do not feel the strong revulsion that Kass describes when considering human cloning, nor do I think that if I did that this would make the practice necessarily morally wrong. Secondly, as a result of the

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41 Ibid: 115.
42 Ibid: 117.
subjective nature of the evaluation of human cloning we cannot say which is correct when opinions conflict. I strongly disagree with the political and religious beliefs that many people hold, as they may do with mine, we may both feel an equal level of “revulsion” for the opinions of the other person, yet we cannot both be correct as to the moral status of the others opinions. This problem also arises in the following section, where I discuss the issue in the context of allegedly universal moral values.

Kass’s position requires that we be able to make an objective claim to the moral status of human cloning from a subjective intuition about the process. As opinion will differ about the ethical status of human cloning and enhancement, the only guide we have as to which opinion is the right one is the assertion that “mine is the correct view” of human cloning. Basing a moral evaluation of human cloning or other forms of genetic technology on who can shout the loudest does not seem to be the most sensible way of determining its ethical status. This is not to say of course that there may not be other reasons to prohibit HGE or human cloning,\(^45\) such as the claim that it devalues or harms the individual created, but these evaluations are based on broader arguments and an evaluation of the consequences of such practices, not the claim that it is simply disgusting and therefore wrong.


Human Nature

In an attempt to demonstrate that human rights are an inherent property of all humans in virtue of their genetic humanity, Fukuyama describes human nature as being that which is present in all humans when all other “contingent and accidental characteristics”\(^{46}\) are ignored or removed.\(^{47}\) Regardless of whether this is reasonable, it does not do the work that Fukuyama requires of it; moving from universal human rights as a result of a shared human nature to a universal system of moral values based on human nature is simply wrong in an empirically demonstrable manner. For example, The Universal Declaration of Human Rights (UDHR) is not accepted by all political, cultural and social groups, and actions which would provoke severe reactions in one cultural context, such as female genital mutilation, are socially acceptable in another.\(^{48}\) Further, human nature and political structures are subject to change as a result of environmental, social or scientific developments. A scientific definition of human nature is more plausible than Fukuyama’s account\(^{49}\) as it acknowledges that human nature changes and is limited only by what is physically possible. While the scientific view of human nature does not settle any normative questions either, it does offer a more plausible account of human nature. In

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\(^{47}\) I discuss Fukuyama’s definition of human nature below and demonstrate several potential concerns which arise from it.

\(^{48}\) This does not, of course show that the positions have equal moral weight, and I do not wish to make such an assertion. However, this does highlight the fact that a single human nature that Fukuyama endorses does not create a single moral value system.

\(^{49}\) Fukuyama’s account of human nature describes a specific set of criteria which must be met in order for an agent to be classed as human. In this way, Fukuyama rejects the possible moral status of posthuman or non-human agents. Further, Fukuyama’s account does not accept that human nature can change. This point seems to be empirically falsifiable as demonstrated by historical changes in political and social structures.
comparison, Fukuyama’s definition of a uniform human nature as an unchanging concept is inaccurate and implausible as demonstrated by broad contemporary and historical cultural diversity. If human nature changes, as it certainly does, it seems to make sense that we should change our political structures to meet the needs of human nature.

It is certainly the case that human nature shapes political structures but it is equally true that scientific developments and social movements shape the perception of that nature. For example, the development of the birth control pill contributed to gender equality by enabling women to control their fertility more reliably.50 Similarly, developments in enabling technologies such as electric wheelchairs have facilitated far greater social participation for people with disabilities who may otherwise have found participation in society more difficult. These developments do not meet Fukuyama’s definition of human nature but they are certainly not immoral and they help to enable social participation for those who have traditionally been excluded. Further, they do fall within the range of the natural as defined in terms of the physically possible, which represents a more plausible account of “human nature” than that offered by Fukuyama.

Social structures also change independently of human nature and may lead to changes in human behavior in order for people to effectively participate in new systems. For example, Irving Zola comments in his paper “Toward the Necessary Universalizing of a

Disability Policy”\textsuperscript{51} that the introduction of workplace computers could have introduced new learning disabilities as people may be unable to learn the skills necessary for many jobs. While the prevalence of workplace computers has not led to recognition of new disabilities, people with access to education on computer usage have a competitive advantage over those who do not.

**Human Nature and Just Political Institutions**

While I am willing to accept for the sake of argument that political structures are based on human nature, this does not provide any justification how they can be said to be ideal as Fukuyama’s rejection of technologies which may cause social change implies.\textsuperscript{52} Fukuyama’s claim is based on the assumption of the legitimacy of liberal democratic decision making\textsuperscript{53} which in itself does not appear controversial; I accept that liberal democratic societies may offer an acceptable system of social justice. However, even granting this does not address the issues presented by changes in social structures as humanity has changed and developed throughout history. If political structures are based on human nature and both have changed, as they unarguably have then it seems bizarre to suggest that we have now reached the “right” kind of human nature and polity and that we should, therefore, resist any further changes. Even accepting Fukuyama’s rejection of the problems caused by the naturalistic fallacy and his dogmatic commitment to one


\textsuperscript{53} Ibid: 186.
particular mode of government and society, we cannot explain why the current liberal democratic structures are the right ones. It is certainly the case that liberal democracies have changed to accommodate new philosophies, ideologies and social movements in the past, so it appears strange to argue that the stage that we currently inhabit should not be changed because it is based on our fundamental human nature.

A consequence of Fukuyama’s picture of society as having reached the ideal stage of development is that we must reject further medical developments or other changes which may alter the nature of society. This seems deeply counterintuitive, we certainly consider disease and disadvantage to be undesirable and there would not be a pharmaceutical industry if we did not place high value on relieving illness or maintaining health. Fukuyama’s position therefore seems to contradict widely held beliefs about the benefits of medical research and the development of new medical technologies.

**Medicine and Human Nature**

Fukuyama discusses the ethics of enhancement in his examination of neuropharmacology and claims that in the majority of cases, individuals with conditions such as depression are not ill but merely express characteristics at one end of the spectrum of normal human functioning. He argues that the provision of drugs such as Prozac does not constitute treatment of a medical condition but the enhancement of an otherwise healthy individual. Regardless of whether the argument that individuals with

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54 Ibid: 41-56.
these conditions are not healthy as they have an actual medical condition is valid, Fukuyama does not show that enhancement rather than treatment is necessarily wrong.\textsuperscript{55} An analogy to this case would be with an individual who is short sighted, as their condition also represents one end of the spectrum of “healthy” eyesight. We would not think it acceptable to refuse spectacles to such an individual and we should not refuse treatment of depression on the same grounds. If we adhere to Fukuyama’s standard we should not provide spectacles to the majority of people with below average vision as their condition merely represents one end of the spectrum of normal human functioning. While Fukuyama acknowledges that in some cases we should provide drugs to people with depression he remains committed to saying that we should allow many people to be avoidably disadvantaged.\textsuperscript{56} Fukuyama does not provide any measure of how to establish who this may be or why we should accept this disadvantage as just.

It is apparent that our social structures are constructed in such a way that individuals with conditions such as acute depression or short sightedness are at a disadvantage compared to those individuals who do not have the same conditions. This disadvantage can lead to avoidable suffering and an inability to lead as full a life as may be possible all other things being equal. Further, if it is possible for the disadvantaging condition to be


\textsuperscript{56} Fukuyama does not reject the presence of disadvantage, but rather states that the disadvantage can be overcome by the individual without the use of drugs. Further, he holds that these “natural disadvantages”, as opposed to social disadvantages, do not merit any attempt to mitigate their effects. My own position is that as we gain the ability to ameliorate the effects of these natural disadvantages we should use them to reduce the disparity between those who are genetically lucky and those who are not.
removed or ameliorated in some way but this is not provided or is inaccessible this represents an unjust limitation on the liberty of the person who is disadvantaged as there is a solution to their disadvantage which is not being made available to them. Therefore, if we can provide some method of alleviating the disadvantage that an individual faces then we should. It is simply not relevant whether the disadvantage is a result of a medical condition, personality type or natural difference in eyesight. Disadvantage may be caused by any of these factors and all may lead to the consequences described; as it is the consequences which are harmful to people, what matters is finding the best way to alleviate the disadvantage and to enable individuals to participate as fully as possible in society in order to maximize their personal liberty and to limit the harmful effects of disability or disease.

A further question arises in Fukuyama’s discussion of aging populations, a phenomenon which is increasingly common in developed nations. 57 Discussing the potential increase in costs of health care and social security which this demographic shift may cause for society as a whole, Fukuyama suggests that HGE may further increase the average lifespan of citizens, which may result in drastic social and political changes. Regardless of whether this is the case it does not offer an argument against HGE that does not also apply to advances in medical technology and to our perspective on healthcare in general. If we wish to justify placing a ban on HGE because it may lead to an increase in the numbers of elderly people who require high levels of support, we must also ban other life
extension therapies, and reduce the palliative care available to the elderly and infirm. While it may be possible to argue that HGE is qualitatively different to conventional medical treatments, I do not think this argument is plausible. While the basis of HGE is genetic rather than chemical, both have the same objective of making people healthier than they would have been in the absence of treatment. Further, while the focus of HGE may be more concerned with prevention of disadvantage, instead of treatment of the causes of it, HGE can be seen to be an extension of our current medical model rather than a radical departure from it due to its shared objectives with conventional medicine and the increasingly preventative stance that medicine has taken, vaccination being the prime example in this case.

**Factor “X”**

Fukuyama takes essential human nature to be that which inheres in all human agents when all other “contingent and accidental characteristics” are ignored or removed. For supporters of liberal equality, Fukuyama argues, this category applies to all members of the human species. Acknowledging that throughout history, the boundaries of the group which was perceived as possessing this factor “X” have changed in response to changing social and religious attitudes, Fukuyama argues that while we are free to socialize and form relationships with individuals based on their non-essential

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58 Ibid: 149.
59 Ibid: 150.
60 Ibid: 150.
characteristics, such as physical appearance or shared political beliefs or interests, in the political sphere we should treat all individuals within the group as morally equal as a consequence of their possession of this essential characteristic.\footnote{I should like to comment that as well as historical changes in the boundaries of those perceived to have this characteristics, certain contemporary cultural paradigms still limit membership of the group possessing this characteristic based on gender or ethnicity.}

By arguing for a genetic essentialist position, Fukuyama explicitly rejects the idea that non-human agents such as the seemingly emotionless Mr. Spock\footnote{Mr. Spock is a Vulcan, an alien species who are characterised by strictly controlled emotions and a focus on logic.} from the television series \textit{Star Trek} or self aware computers can be regarded as moral agents.\footnote{James Hughes, \textit{Citizen Cyborg: Why Democratic Societies Must Respond to the Redesigned Human of the Future} (Cambridge, MA: Westview Press, 2004), 169-170.} Fukuyama claims that an agent as truly emotionless as Spock appears to be should be regarded as a “monster”\footnote{Francis Fukuyama, \textit{Our Posthuman Future: Consequences of the Biotechnology Revolution} (New York, NY: Picador Press, 2002), 169.} or “psychopath”\footnote{Ibid: 169.} to whom we have no special duty, but this seems deeply counterintuitive.\footnote{Ibid: 169.} While I agree that we may feel that such an agent was strange or potentially dangerous based on their perceived lack of empathy, I do not think that such a judgment justifies treating them as moral outcasts in the way Fukuyama suggests. Indeed, the claim that we can perceive such an agent as unworthy of the moral value which we place on human agents seems to be reminiscent of the arguments used to justify segregation based on racial or gender grounds,\footnote{Allen Buchanan, “Human Nature and Enhancement,” \textit{Bioethics} (2008): doi:10.1111/j.1467-8519.2008.00633.x: 3.} a position that Fukuyama would, I think, want to reject. While Fukuyama’s argument is not overtly sexist or racist, it is certainly
“speciesist”⁶⁸ and ignores the legitimate moral claims that non-human entities⁶⁹ may have. This is significant in the debate over HGE as it is possible that through the application of enhancement technologies a new kind of human may evolve, one that does not meet Fukuyama’s criteria for moral agency. If we accept Fukuyama’s requirements for moral value then it is possible that these agents may not be considered as being worthy of moral consideration.

By explicitly rejecting the moral claims of individuals lacking a human genome, Fukuyama offers a picture of morality that is excessively restrictive and worryingly reminiscent of historic anti-egalitarian arguments which sought to restrict political liberties based on grounds of an alleged lack of competence or of certain intellectual faculties. While Fukuyama claims that all humans have these faculties and we would therefore not be excluding anyone in the same way as has been done in the past, he unjustifiably excludes non-human agents with all or most of these capacities and human agents with cognitive disabilities who may lack certain characteristics.

In response to Fukuyama’s claim that moral worth requires a human genome and certain attendant faculties such as emotion, reason and rationality,⁷⁰ I would suggest that a more appropriate model would be to remove the requirement of humanity from the definition

and to place less strict requirements for possession of all the faculties described. 71 This would have the effect of broadening the category of those worthy of moral consideration to include non-human entities such as Mr. Spock, who clearly seems to be worthy of our moral consideration self aware and reasoning agent that he is. By broadening the boundaries of the moral group to include posthumans we include those agents who would be excluded by Fukuyama’s model. This is important as it allows for the consideration of the morally significant disadvantage caused to posthumans, which is likely to result from excluding these individuals. As these individuals are capable of experiencing suffering and other harmful effects of discrimination, such as restrictions of personal liberty, disadvantaging posthumans because they are not human is unjustifiable.

**Regulation**

The argument that HGE is unnatural and therefore morally impermissible seems implausible. Even if we accept his definition of human nature, Fukuyama does not show that because HGE does not fit into his picture of the natural there is a moral argument against its use. Further, if we did accept the primary moral importance of the natural we would have to re-evaluate the ethical status of many existing medical treatments. A complete ban on HGE would also severely limit individual reproductive autonomy by placing restrictions on available medical treatments for genetic disease. It is also possible

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that a ban on HGE research and technology may lead to further bans on existing reproductive technologies which make use of our current limited understanding of genetics such as in-vitro fertilization (IVF) or even the birth control pill. There may, of course be other reasons why we might wish to place restrictions on HGE but these represents precautions against harms to people rather than harm against a metaphysical concept and are discussed in the following chapter.

While I disagree with the majority of Fukuyama’s argument about the importance of human nature and the consequent impermissibility of HGE I agree that regulation of HGE is of high importance. I agree that when we are moving into areas of research, the outcomes of which are relatively unknown to us, we should be extremely careful. However, while we are unaware of all the outcomes that research into HGE will have, this should not prevent us from pursuing these goals. Pharmaceutical research is tightly controlled and new drugs and procedures must go through extensive clinical trials before being approved for public use. Similarly progress in nuclear technology had been slow in part due to the need for extensive regulation and stringent controls on research.

Simply because a new technology has the potential to be dangerous does not provide justification to cease our pursuit of knowledge, particularly when the potential rewards are so great. All the dangers can do is to demonstrate the need to be careful and to move only as fast as prudence allows.\textsuperscript{76} Further, given the potential impact that HGE could have, both on individuals and society as a whole, it is important to regulate to ensure that those technologies which do become available are used in order to promote individual wellbeing on a broad scale rather than to create new kinds of discrimination and disadvantage.\textsuperscript{77} In the following section I examine the importance of careful regulation of HGE for personal liberty and argue that certain genetic enhancements should be available to everyone regardless of their ability to pay. I also argue that while a blanket prohibition on HGE is excessive, a completely free genetic market is also potentially harmful to a large number of people. While it may appear that a genetic free market may be the only alternative to a blanket prohibition on HGE, such a system would create disadvantage for those unable to afford genetic treatment, as I discuss in the following section.

\textbf{Personal Liberty}

Open access to certain forms of HGE, such as treatment for genetic disease, enhancement of cognitive function and the immune system, is necessary to protect personal liberty, as I shall demonstrate below. This is important, as the failure to protect personal liberty means that individuals face greater difficulty in achieving their life goals. A blanket prohibition on HGE limits personal liberty as it removes individuals’ ability to choose

treatments for themselves or their offspring which may reduce avoidable suffering. In contrast, a genetic free market\textsuperscript{77} would also limit personal liberty for those unable to afford genetic enhancement as it would not only restrict access to important genetic treatments and potentially lead to disadvantaging medical conditions, but it may also lead to further social disadvantages such as employment discrimination. It is the second of these issues that is more challenging to demonstrate, though it seems clear that the former presents an obvious case of unjust discrimination. If certain disadvantaging conditions are only treatable through genetic means then it seems uncontroversial to suggest that withholding treatments necessary to alleviate a given condition or disposition on financial grounds represents unjust discrimination against the poor. At the very least it prevents equality of opportunity. While it may be possible to argue that this is an acceptable cost when applied to maximizing individual liberty, an appeal to the maximin principle\textsuperscript{79} refutes this claim.

By providing HGE through a publicly funded system, it would be possible to maximize the minimum potential benefit available to all individuals whilst imposing only a minimal cost through taxation on those who are able to pay and limiting only slightly the liberty of the wealthy.\textsuperscript{80} In the case of social discrimination, the question is at one remove from medical disadvantage but still represents an unjust limitation on personal liberty. In a

\textsuperscript{77} I discuss these issues in more detail in the following chapter.
society where genetically enhanced individuals make up a large demographic they are likely to have an impact on employment competition as they are likely to have a wider range of capabilities than unenhanced individuals. For example, in an employment system where a large number of people have enhanced cognitive abilities or an improved immune system, those without these capacities would face significant disadvantage in competing for employment, as employers are likely to want to employ those with the broadest possible range of capabilities. This is different from the current disparity between the cognitive capabilities of individuals as there would be technology available that would enable people to compete at the same level. This is analogous to education where access to elite private schools is expensive but offers significant advantages in terms of education and opportunity compared to public schools. Here again, the wealthy have the ability to increase the opportunities available to their offspring in a way that the poor do not. However, the issue of HGE is more significant than that of public and private education, as there is a public system of education to provide for those who cannot afford private education where in a completely free genetic market there would not be a system of public HGE available for the poor. In order to meet a minimum level of equality of opportunity a publicly funded system of HGE such as the British National Health Service (NHS) would be necessary to ensure that people with lower incomes had at least some level of access to beneficial genetic treatments.

82 Ibid: 189-190.
While a genetic free market may appear to offer the best possible way of ensuring individual liberty, it would place restrictions on the liberty of those unable to afford enhancement which may lead to their being disadvantaged compared to the enhanced. As these restrictions may lead to unenhanced individuals being effectively disabled in a new genetically enhanced social framework, the disadvantage that would result can appropriately be described as unjust because the disparity in capability is the result of genetic treatments which could be made publicly available in the same way as education and conventional medical treatment. A free market of any of these resources, education, health care or genetic enhancement may benefit the wealthy but it does not maximize the welfare for those in lower income brackets.

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Chapter 3

Consequentialist Objections to Genetic Enhancement

In the previous chapter I demonstrated that the deontological arguments put forward by bio-conservatives against HGE are unsuccessful at justifying a complete prohibition on HGE. I also argued that a system of regulation is necessary in order to protect individual liberty and to limit the risks of enhancement. In this chapter I examine the possible consequences of HGE and argue that while they do offer grounds for imposing strict legislation on the new science of enhancement, they do not offer justification for a complete ban. The concerns which arise to oppose HGE can mainly be found to be a result of the belief that any regulation will be ineffective at preventing various forms of social injustice and the harms to individuals that may result from the development of enhancement technology.

While the concerns of liberal opponents to HGE can broadly be characterized as focusing on social injustice and individual harm, these two categories contain a number of more specific issues which each need to be addressed. While the consequences of social injustice also cause harm to individuals, these kinds of harms are related to the changes in society which may occur as a result of HGE, for example, being discriminated against in employment\(^{84}\) or seeking life insurance\(^{85}\) as a result of lacking certain genetic


\(^{85}\) Ibid: 3.
enhancements. In contrast, the kinds of harm which are directly harmful are those which may have an immediate negative effect on an individual independently of the wider impact of HGE technology. It is these kinds of harms that I address first as they represent both the most problematic argument against HGE and the simplest to reject. I also consider the objections raised by advocates for disability rights as these concerns exemplify fears about genetic treatment on a broad scale.

**Direct Harm to Individuals – Physical Harms**

The claim that HGE will cause significant individual harms such as genetic abnormality causing significant physical or mental disability, which cause suffering or limitation of opportunity to people who have been enhanced\(^{86}\) is, if true, highly persuasive.\(^{87}\) This argument is based on the fact that we do not fully understand the ways in which genes interact in influencing phenotypes and that it is therefore possible that we will cause significant harm to individuals who undergo genetic enhancement.\(^{88}\)

It is reasonable to argue that if a technology will be directly harmful to people with little compensating benefit then it should not be pursued. This position seems uncontroversially correct as it would seem bizarre to pursue a technology that on balance produces more harm than good. However, while the argument seems valid, the premise that harm is an inevitable consequence of HGE has not been shown to be correct. While

\(^{86}\) HGE also has the potential to harm the unenhanced as well and I discuss these kinds of secondary harms below.

there are risks associated with any technology it is not the case that research into HGE will necessarily be harmful. As I argued in the previous chapter, in the past we have not always known the full consequences of the pursuit of scientific knowledge but we have continued with our pursuit in an appropriately cautious manner.

For example, both pharmacology\textsuperscript{89} and nuclear power\textsuperscript{90} have faced concerns over safety and have both responded with strict regulation. While I accept that it will be difficult to provide justification for research into a technology which will cause significant harm, it has not been shown that HGE will do this and it is not enough to deny the possibility of potential enhancements based purely on speculative fears.

**Psychological Harm and Offspring as Means to an End**

In addition to the direct physical harm caused to offspring as a result of enhancement, it is argued that there is the potential for psychological harm if they become aware that they are the product of conscious choice rather than of random chance. This argument can be found in discussions of preconception gender selection,\textsuperscript{91} reproductive cloning\textsuperscript{92} and

\textsuperscript{88} I discuss the issue of capability to consent of offspring in the following chapter.  
genetic enhancement\textsuperscript{93} more broadly and is based on the claim that a child who is enhanced to meet certain criteria will have difficulty with their personal identity. These difficulties supposedly include; a feeling that they do not have an open future, dissatisfaction with the choice of genome that their parents made, or a feeling that they were merely instruments of their parents' will, and that they were born only to fulfill their genetic promise.\textsuperscript{94} However, while these psychological problems may appear to be a counter-argument against the goods to be gained from HGE, they are all based on an overly strong reliance on genetic determinism.\textsuperscript{95} While genetic determinism is an important consideration as HGE would not be pursued if we did not have certain expectations of it, believing that everything about a person’s life is controlled by their genes is inaccurate.\textsuperscript{96} Further, they ignore the valid reasons parents may have for choosing such a course of action including the prevention or avoidance of inherited disease or selection for donor suitability.\textsuperscript{97}

\textbf{Genetic Determinism and Psychological Harm}

Though concerns such as these may seem to carry significant weight, they all stem from an unrealistic picture of the importance of genetics.\textsuperscript{98} While the genotype of any

\textsuperscript{94} Ibid: 36.
individual will play a significant role in shaping the phenotype of that person, environmental factors such as education and diet are equally as important. To believe that genetic intervention will determine the entire range of one’s life is to ignore the extremely complicated interaction between genes and environment involved in shaping the expression of our phenotype.  

To believe that because you have been the subject of genetic enhancement or selection means that your life is predetermined is mistaken. However, this does not mean that it will not cause distress to the individual who holds the belief. While a mistaken belief can still be psychologically harmful the problem is relatively easily avoided through education and counseling. Indeed it is possible to argue that without the genetic intervention the child in question would not have existed at all. This claim may be made by reference to the non-identity problem whereby the individual created would not have existed had the enhancement not occurred. Therefore, as there would have been either no individual or a different individual the person created through enhancement or selection cannot make the claim that they were harmed as a result of the genetic intervention as they may not have existed otherwise.  

potentially make such a claim would be if their life was not worth living as a result of severe, chronic illness and suffering caused by genetic intervention.\textsuperscript{103}

A further argument against claims of a limited future or criticisms of “genetically pushy parents”\textsuperscript{104} is that any such enhancements are likely to represent the parent’s views of what is valuable or beneficial to their offspring. As such, genetic interventions are likely to be influenced by concern over the welfare of the child. In this way we can compare genetic interventions to exhortations to work hard at school or to participate in particular extracurricular activities. While the child produced may be able to ignore advice or refuse to participate in organized sport they cannot ignore their genetic makeup.\textsuperscript{105} However, making a complaint based on the harm caused by one’s genes is vulnerable to criticism via the non-identity problem and is thus untenable. Such concerns also assume that parents will have high expectations for their children and that such expectations are necessarily harmful.\textsuperscript{106} Narrow focus enhancements such as those required for athletic success may well be permissible, but it is unlikely that they should be publicly funded due to limitations on resources. I discuss this question in more detail in the following chapter when I examine the range of enhancements which should be publicly funded.

It is of course possible that in an unregulated system, genetic interventions may be chosen which will create significant disadvantage. For example, engineering someone to


\textsuperscript{105} Ibid: 36.
be deaf in order that they gain the benefit of the parent’s deaf culture would also limit the child’s future unjustifiably.\textsuperscript{107} I discuss this issue in more detail in the following chapter when I discuss the importance of maximizing life goals in determining the appropriate level of regulation to be placed on HGE.

\textbf{Means to an End}

The risks associated with genetic selection of children to meet certain criteria, such as “replacing” a lost child or loved one is again the result of overconfidence in genetic determinism.\textsuperscript{108} These instances may well lead to parents of genetically enhanced offspring having unrealistic expectations of how the selected child may behave which may conflict with the child’s own life plan, but these conflicts may be avoided through regulating effectively to protect the interests the child has in having the ability to live the life she chooses and by providing education and counseling to parents wishing to pursue such a course of action. Similarly, while it may be possible to engineer the perfect athlete through selection of specific genetic characteristics, doing so could place excessive limitations on the life of the child so created, as I shall discuss in the following chapter. As such it is reasonable to hold that enhancements such as these, if permissible, must be privately funded. In the case of selection of offspring to meet criteria for organ or blood

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\textsuperscript{107} Allen Buchanan et al., \textit{From Chance to Choice: Genetics and Justice} (New York NY: Cambridge University Press, 2000), 281-284.
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transplant, this process is not inconsistent with the child having as full a range of life options open to them whilst also acting as a donor for their sibling or parent. 109

Cases where a particular child is selected for specific biological characteristics such as having a specific blood type to facilitate organ donation for a sibling 110 also raise interesting issues involving the relationship the child has with her parents. If the child is harmed by being born into a family to act as a donor for a sibling this may appear ethically problematic but harm can be avoided by adhering to current regulations protecting the interests of children. 111 I also think that this scenario is unlikely as the knowledge that one was born in order to help a sibling may lead to stronger familial bonds as a result of gratitude and a feeling of “specialness” for the selected child. Simply because a child is selected to be a match for a sibling in need of a transplant does not mean that they will only be valued as providers of spare parts, they are also likely to be valued in and of themselves. 112 While it may be the case that some children might feel like spare parts, there is no reason to suppose that they necessarily will.

The child selected to act as a donor would only have a claim that they were worse off having been born 113 to act as a donor than not at all if the life that they have is on balance

not worth living and it is not clear that this would be the case.\textsuperscript{114} Further, it would seem to be deeply counterintuitive to suggest that in a context where the technology exists that would allow such selection we should allow one child to die rather than select another child who would also have a life worth living and who could act as a donor for the older child.\textsuperscript{115} We would not think it wrong for parents to attempt to have a child through sexual reproduction that could act as a donor so it seems strange to suggest that it becomes unacceptable when we increase the likelihood of success through scientific means. The Kantian imperative that we not treat any person merely as a means to an end\textsuperscript{116} is relevant here but the case of the selected donor does not contradict this imperative. Further, it is not clear that the child will not be valued as an end in themselves as well as the means to her sibling’s survival. Similarly, we currently allow parents to consent to transplant surgery on behalf of their children so it seems odd to suggest that the concern of functionalizing our offspring only occurs when genetic selection is involved.

Questions relating to cloning are relevant to the issue of HGE as they offer similar concerns about the treatment of selected and enhanced children.\textsuperscript{117} While cloning is not genetic enhancement, both encounter similar objections from bio-conservatives. In the case of HGE it is possible that parents may choose enhancements for their offspring that


do demonstrate a bias towards a particular picture of the good life. However, while they may have expectations of the child beyond simply being their child, just as parents of selected donors have specific goals for their children, it is not clear in either case that the child produced by cloning or enhancement will be harmed by these expectations.\textsuperscript{118}

\textbf{Social Harm – Discrimination, Disadvantage and Disability}

The potential social consequences of HGE offer the most problematic obstacle to be overcome for advocates of genetic enhancement. The Nazi Holocaust\textsuperscript{119} offers perhaps the most striking example of what can happen when poor science and racism become the focus of social policy and discrimination. However, while the example is useful, it does not show that all types of genetic research and enhancement are morally unacceptable; rather that state sponsored discrimination is repugnant, and morally wrong. With appropriate regulation it is possible, using examples such as these as a warning, to establish acceptable types of research and enhancement and to ensure that the technology respects egalitarian principles rather than undermine them. I discuss the types of regulation that would respect both egalitarian principles and principles of personal liberty below.

\textsuperscript{119} Allen Buchanan et al., \textit{From Chance to Choice: Genetics and Justice} (New York NY: Cambridge University Press, 2000), 37.
The more troubling problem is that of so-called “backdoor eugenics”\textsuperscript{120} whereby the existence of genetic enhancement technology in society would lead to social changes which may discriminate against the unenhanced or put social pressure in terms of the need to compete on people to undergo genetic treatment. The more worrying concern is that any attempt to treat the genetic causes of disease and disability will lead to further discrimination and stigmatization of people with disabilities. This concern is based on two main issues; firstly the belief that the pursuit of treatments for genetic disabilities represents the view that people with disabilities are somehow inferior to able bodied people and that their lives lack value.\textsuperscript{121} The second concern is that as HGE becomes more common, the number of people with disabilities will decline, leading to a perception that there is less need to work towards improved rights and social accessibility for people with disabilities and less need to develop enabling technologies.

\textbf{Valuing Lives}

The concern that the advent of HGE will lead to discrimination against people with disabilities should be taken seriously. The potential benefits of HGE in terms of improved health or cognitive function are certainly attractive but if they come with the cost of increased discrimination and harm to large numbers of already disadvantaged people then it does not seem possible to justify the pursuit of such advantages, the costs are simply too high. However, while these concerns should be taken seriously they do not represent

\textsuperscript{120} Troy Duster, \textit{Backdoor to eugenics} (New York NY: Routledge, 1990).
\textsuperscript{121} Allen Buchanan et al., \textit{From Chance to Choice: Genetics and Justice} (New York NY: Cambridge University Press, 2000), 274-276.
the necessary consequences of HGE; it is possible to pursue enhancement technology without risking the significant harms of discrimination and unjust disadvantage by continuing to adhere to current anti-discrimination legislation such as the British Disability Discrimination Act.¹²²

Buchanan et al.¹²³ discuss this question in relation to other potential consequences of HGE and argue that rather than devaluing people with disabilities, it is the disability itself and the barrier to equality of opportunity that it represents which is not valued as I discuss below. While the judgment that people with disabilities are somehow inferior or that their lives are of less value than those of able bodied people is an injustice to people with disabilities, the pursuit of genetic enhancement technology does not necessarily reflect this view. Rather, Buchanan et al. argue that the claim that HGE necessarily expresses negative views about the lives and value of people with disability ignores the valid interest that people may have in not being disabled.¹²⁴ It is coherent, Buchanan et al. argue, to simultaneously recognize the value of a life involving disability, whilst also having an interest in not being disabled oneself.

Procreative Beneficence

Julian Savulescu argues for a principle of procreative beneficence whereby prospective parents have an obligation to ensure the best possible quality of life for their offspring, including making use of genetic enhancements.125 This obligation can be seen to be as a result of the considerable value of opportunity and welfare,126 both of which may be limited to varying degrees by different kinds of disability. Therefore, it is both reasonable and non-contradictory to recognize the value of the lives of people with disabilities while also maintaining one’s interest in not being disabled. If we examine Feinberg’s127 argument about the rights of children to have as open a future as possible, the limitation on equality of opportunity that genetic disease and disability may cause seem to merit consideration when evaluating the moral status of HGE. If genetic disease and disability may limit a child’s future and a medical intervention is available it seems that failing to make use of it will limit the child’s future. Where Feinberg discusses only the importance of not limiting a child’s future, Julian Savulescu goes further and argues that there is a positive obligation128 to enhance our children in order to maximize their potential opportunities and welfare. For Savulescu, genetic enhancements are similar to taking vitamin supplements or refraining from drug use during pregnancy. If a child is desired

and if the technology is available that will promote their interest, defined in terms of quality of life, Savulescu argues it should be used as a matter of parental duty.

Savulescu’s argument has been criticized as ignoring the problems associated with access to technology and the high level of impact that an obligation to enhance will have on women.\textsuperscript{129} With regard to the first problem, I have argued that a just system of genetic enhancement must provide at least a basic level of publicly funded treatment in order to meet the needs of those unable to afford treatment.\textsuperscript{130} The second question is more problematic but is answered by Savulescu’s original claim, which he reaffirms in a later paper on the same subject,\textsuperscript{131} that while there are good reasons to select the best child, such as maximizing opportunity or avoiding inherited disease, parents should still be free to not pursue these enhancements if they feel that the costs are too high.\textsuperscript{132} This apparently contradictory conclusion can be reached by arguing that the cost of forcing people to enhance outweighs the benefits associated with enhancement. Therefore, we should encourage people to pursue publicly available enhancement but we should not force enhancement upon them.

\textsuperscript{132} A further concern is that certain enhancements represent zero sum games, where for someone to gain an advantage another person must be equally disadvantaged. I discuss this in more detail in the following chapter, where I examine the range of genetic enhancements which may legitimately be provided under a public health model.
Methods of Discrimination? – Treatment, Avoidance, and Selective Abortion

Buchanan et al. also argue that the opinion that the lives of people with disabilities are not worth living can only be expressed in one of four methods of genetic treatment. The four methods reported are; the use of genetic “surgery” to switch off a disease gene, resulting in the same individual being born without the inherited disability. Secondly, avoiding the conception of a child found to be at a high risk of having a particular genetic condition which would cause a disability through the use of contraceptives. Thirdly, avoiding conceiving a child found to be at a high risk of having a particular genetic condition which would cause a disability through donor insemination or embryo transplant. The final option available is to prevent the birth of an individual who will have a genetically caused disability by aborting the fetus.

Obviously, the second and third options share many similarities, with the main difference being the method used to avoid the conception of a particular individual. Further, it is only selective abortion which will prevent the birth of an individual who would otherwise have existed, and it, like the other options, is currently legal. While it may appear that the use of any of these options displays a discriminatory view of people with disabilities, the three technologies which are currently available, avoidance through contraception or surrogacy, or selective abortion are all legal and to prohibit them would place unjustifiable restrictions on the liberty of existing, as opposed to potential, persons. This is significant as we cannot be said to harm someone who exists as a result of genetic
intervention so long as their life is worth living.\textsuperscript{134} We would also be making the claim that fetuses have a right to be born, a right which is not currently accepted as being valid.\textsuperscript{135} While Savulescu’s\textsuperscript{136} argument for the obligation to children who will be born might appear to make a similar claim, this is not the case. Savulescu’s argument applies only to people who the parents have decided will exist, in the case where no such decision has been made, the fetus that will be aborted or the embryo that is not conceived will never exist as a source of moral claims and so we cannot be said to have obligations to them.

If we were to make a claim that the avoidance of conception of people with disabilities represents harm to people with disabilities and is therefore impermissible, we also make a related claim that potential parents have an obligation to conceive children as regularly as possible in order to promote the rights of the unborn. That claim, as well as being absurd, is, I think, unduly restrictive on the rights of parents not to have children. Similarly, making the argument that selective abortion harms people with disabilities leads to an infringement on the rights of women to choose whether to have an abortion or not. Therefore, if we accept that abortion of fetuses likely to have disabilities is impermissible due to the harm it causes to people with disabilities we must also re-examine our stance

\textsuperscript{133} Allen Buchanan et al., \textit{From Chance to Choice: Genetics and Justice} (New York NY: Cambridge University Press, 2000), 274-276.


on abortion for any reason, a move that represents an unjustifiable infringement on the liberty of actual people.

Objections to selective abortion also ignore other valid reasons that people may have for choosing to abort a child that are not caused by the belief that the lives of people with disabilities are not worth living. For example, Buchanan et al.\textsuperscript{137} argue that the belief that having a child with Down’s syndrome will lead to severe strain and limitation on life goals of the parents, or will make fulfilling obligations to other children more difficult is not inconsistent with the belief that the life of the fetus will be worth living and be of value both to the child themselves and to others. Parents may have legitimate reasons for choosing to abort a fetus that do not express a negative perception of the lives and value of people with disabilities. All that is necessary for selective abortion to be justifiable is the belief that fetuses do not have the right to be born\textsuperscript{138} and that women have a right to choose to have an abortion if they wish to.

\textbf{Loss of Support}

A second concern raised by disability rights advocates is that the use of genetic treatment or enhancement will lead to a gradual reduction in the number of people with disabilities, which will lead to a belief that there is less of a need to improve the general accessibility

\textsuperscript{137} Allen Buchanan et al., \textit{From Chance to Choice: Genetics and Justice} (New York NY: Cambridge University Press, 2000), 276.

\textsuperscript{138} Ibid: 277.
of social institutions\textsuperscript{139} or to pursue new enabling technologies or drugs. This reduction in the level of support, it is argued would be harmful to people with disabilities as it would lead to a loss of facilities necessary for specific individuals to participate as fully as possible in society. Like other consequentalist arguments against HGE this argument is not convincing. Firstly, it is unlikely that a reduction in the number of people born with disabilities will cause a reduction in the level of support and advocacy for people with disabilities, because of the work already done by disability rights advocates\textsuperscript{140} in highlighting the need to improve access to social institutions for people with disabilities. While it is predictable that the total amount of support available to all people with disabilities will go down, it is not necessarily the case that the amount of support available to individuals will also be reduced. Secondly, and of more interest is the implicit claim within this argument that because a reduction in the number of people with disabilities will lead to a reduction in the level of support available to them, parents of potential persons who would not be disabled if HGE was used have an obligation to refuse HGE in order to protect the interest that people with disabilities have in not having the level of support available to them reduced. This claim obviously ignores the valid interest that the potential person themselves has in not being disabled in deference to an indistinct claim about the rights of a group. Even if we treat the interests of the group as a specific, competing interest of one individual, to treat the interest that they have in not having the level of support available reduced as on par with the interest that they have in

\textsuperscript{139} Ibid: 266-269
\textsuperscript{140} Ibid: 331.
not being disabled in the first place seems implausible. We would be asking them whether they would prefer a life without chronic pain, for example, or a life with chronic pain which is controlled by drugs, a question that does not seem to compare equal outcomes. Thirdly, we ignore the rights of actual people with disabilities to pursue medical treatments, such as surgery which will either prevent them becoming disabled or will alleviate the effects of an existing disability, for example by undergoing the implantation of a cochlear implant to improve the hearing of someone who is deaf.

However, the final claim, that a reduction in the number of people with disabilities will lead to a reduction in the amount of research that is undertaken to provide enabling technologies and pharmaceuticals, is significant and should be considered seriously. Given the nature of the pharmaceutical industry it is possible that as markets for drugs shrink the amount of research undertaken for new drugs will also be reduced. This would be similar to the current lack of research into “unprofitable” diseases. However, while this may be true, this does not offer a conclusive argument against HGE; prevention of disabling conditions through genetic treatment may represent the most effective use of limited resources to increase individual liberty and equality of opportunity in the same way that vaccination is a more effective public health measure than attempting to treat a highly infectious disease after the fact. Also like vaccination, the existence of

141 Ibid: 269.
preventative technology does not preclude research into reactive, as opposed to preventative, treatments for disabling conditions such as genetic disease.

**New Disabilities**

It seems evident that disabilities result from a combination of physical or mental impairment in combination with a specific construction of social institutions. In certain cases, a specific impairment may not constitute a disabling condition while the same impairment may cause significant disadvantage in another context. Therefore, it is possible to argue that with an evolution of medicine to include genetic treatment we may create a social context with new disabilities which were not present in the pre-enhancement context. For example, writing in 1989, Irving Kenneth Zola questioned whether the increasing occurrence of computers in the workplace would lead to a new type of disability, relating to impairment in working with the new technology. In the case of computers we have not seen a significant increase in the range of existing disabilities, indeed computers have been used to facilitate social inclusion for people with mobility and communication disabilities such as prominent physicist Stephen Hawking. Of course, while the impact of computers in creating new disabilities has been minimal, HGE has the potential to have a large impact on the range and nature of disability in the future.

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While it is certainly possible that HGE will have an impact on the nature of disability in the future, fears that it will necessarily be harmful are unjustified. HGE may redefine our social systems in such a way that our ideas of what it means to be disabled do change but the fear that this will lead to harms to persons is purely speculative. Further, this fear ignores the significant benefit to be gained in terms of maximizing equality of opportunity and avoiding disadvantage that HGE offers.

Buchanan et al. argue that choosing a “basic cooperative framework of society” will also determine who is disabled in that society, given the way in which certain impairments will be disabling in certain contexts but not in others. In this way HGE may lead to a different set of impairments being classified as disabling, but this does not represent a definitive argument against the pursuit of HGE. Firstly, it is not clear that such an outcome is necessarily unjust or harmful to people now or in the future as it is unclear that these new disabilities will be more disadvantaging than those that currently exist. Further, the pursuit of HGE does not rule out the simultaneous pursuit of more inclusive social systems to facilitate the participation of people with disabilities. Secondly, it is possible that the minimum standard of individual welfare will be higher under the new social framework than in the current system. This possibility is again speculative, but it merits evaluative consideration alongside concerns about the standards

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of individual welfare in the new system. Finally, the objection from speculative fears does not take account of the real disadvantage that currently occurs as a result of disability and genetic disease. This is significant as it seems reasonable to suggest that the actual disadvantages of existing people are more significant than speculative fears about the potential disadvantages faced by potential persons who may not exist if not for the changed societal framework.

**Individual Liberty**

In the following chapter I focus on two main issues: the range of enhancements which may be permissible and the distinction to be made between which treatments should be publicly or privately funded. I also discuss the issue of personal liberty in life goals and reproductive autonomy. It is the last of these issues which is most interesting as it directly affects the way in which we must look at these fundamental questions relating to HGE. Questions of personal liberty are central to the issue of why and how we should pursue HGE as personal liberty, equality of opportunity and individual welfare are all infringed by disease and disability.

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Chapter 4

Personal liberty and Human Enhancement

In previous chapters I discussed arguments against human enhancement and demonstrated that both deontological and consequentialist objections to HGE are unsuccessful in providing justification for prohibiting genetic enhancement. In this chapter I offer an explanation of the main reason for pursuing HGE: personal liberty. Personal liberty is curtailed by genetic disease and disability, and restrictions on personal liberty limit the range of options available to us. Having limited options reduces the extent to which people living with disease and disability have equal access to opportunity. This becomes a justice concern when there are options available that will prevent the life limiting factors, in this case genetic impairments, from occurring. Taking personal liberty to be of high importance also offers guidance as to how we should pursue genetic enhancement technology and the range of enhancements which should be permitted. A further consequence of taking personal liberty to be of primary importance is that it offers guidance as to the kinds of enhancements which should be publicly funded and those which individuals must purchase for themselves. I take Joel Feinberg’s claims about the child’s right to an open future\textsuperscript{149} to be significant here as it is an effective tool in determining what is in the interests of a child born as a result of enhancement.
The Range of Permissible Genetic Enhancements

A major concern of liberal opponents to HGE is that parents will use enhancement technology to specify the kind of lives that their offspring may have, functionalizing them into superb athletes or computing machines. Such a course of action would, it is argued, deny the child the right to choose their own life goals as they would be designed for a specific course of action. Accepting for the moment that such a course of action may occur, I believe that it would not necessarily be harmful to the child produced. As I argued in the context of selection for donor suitability, while it may be the case that parents may have a specific concept of the good life for their child, this is not incompatible with the child enjoying that life and being valued in virtue of their own personhood. However, while we may allow such enhancements to occur we should not necessarily publicly fund them as they do not represent a reasonable baseline of genetic capability, as I discuss below.

Enhancing a person to be a phenomenal athlete may not be the kind of enhancement that we should fund but it does not necessarily cause harm to the individual who is created in this way. The main reason for not funding enhancements such as these is that it comes very close to state imposition of a particular value set; all-purpose enhancements such as

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151 See chapter three.
health, longevity and intelligence\textsuperscript{153} do not do this as they suit a wide range of possible life plans. The application of these “broad spectrum” enhancements will help to improve quality of life regardless of which life they are applied to. The same can not necessarily be said for “narrow focus” enhancements, such as enhanced athletic ability.

Like Savulescu,\textsuperscript{154} I believe that if parents have decided to bring a child to term they have an obligation to act in such a way as maximize the child’s quality of life. In this way, enhancing a child to a certain level of improved health or intelligence could be seen as a correct moral action, though not necessarily praiseworthy, in the same way as refraining from drug abuse during pregnancy. A child who has received enhancements for health or intellect may have more chance to have a higher quality of life compared to an unenhanced child in the same way that a child whose mother refrained from using drugs whilst pregnant may have an advantage over a child with fetal alcohol syndrome. Similarly, engineering\textsuperscript{155} a child to have genetic characteristics that will make them extremely talented in such a way as to close most possible lives to them whilst making them well suited for one particular life is acceptable, though does not qualify for the status of broad spectrum enhancement that should be publicly funded. It is the case that if a child is engineered in a certain way as to commit them to one specific life path it is unlikely that they would be able to object to that selection; it is, after all, everything that


they have known and it is unlikely that they would be able to objectively evaluate the life that they have been given. Indeed, an engineered person who complained that they did not want this life seems to have the problem that the alternative is no life at all, as they would not have existed had they not been engineered. The fact that we are essentially limited by the biology that we inherit by chance is a factor in limiting our ability to complain about our status as engineered entities as we cannot reasonably complain to one or both of our parents that they should have chosen a mate with superior genetics in order to provide us with the best possible genetic chance for success as to do so would be to rule out our own existence. This absurdist claim is also vulnerable to rebuttal via the non-identity problem.

While we can refute complaints about being engineered via the non-identity problem, it is still a relevant consideration when defining the range of genetic treatments and enhancements which should be publicly funded. In cases where we do have some control over the characteristics expressed in our phenotype, it seems that it is appropriate to limit the range of acceptable treatments to those which will maximize the quality of life for our offspring, and to promote those enhancements which will benefit our offspring regardless of context. While it is possible to argue that narrow focus enhancements offer the best options for our offspring and should therefore be funded like broad spectrum

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155 The term engineering is appropriate here rather than enhancement or selection as it offers the most accurate picture of what is occurring in this context; the child is being “built” to fit a certain life, rather than having certain genetic traits enhanced or removed.
156 I take the case of engineering to be different from that of enhancement or selection as in the latter cases, the same person will exist with or without certain characteristics.
enhancements, the latter offer a baseline of genetic “capabilities” which will benefit individuals regardless of the context whereas narrow focus enhancements are only beneficial in a specific context. Narrow focus enhancements may also require at least some of the former kinds of enhancements, an enhanced immune system for example, but also require additional enhancements such as a more efficient muscular or respiratory system. Broad spectrum enhancements are analogous to medical care and education, in that they are extensions of existing social institutions which are seen as the right of all people. In contrast, narrow focus enhancements are similar to elite sport coaching or cosmetic surgery, they may be helpful, but they are not the right of every person.

**Public Funding of Enhancements**

Nick Bostrom distinguishes between intrinsic and positional\(^{159}\) enhancements in terms of the kind of benefit that the enhanced individual will gain from having them. The former, he argues, are such that they would offer a benefit regardless of whether other people had them or not, examples include improved health, longevity or intelligence, while the latter depend on the owner to have the best available enhancement to gain a benefit from it, such as height for example. While this offers a useful starting point for consideration of public funding of genetic enhancement, it seems more helpful to talk in terms of broad spectrum and narrow focus enhancements as I have above, as it seems that those enhancements which Bostrom classes as offering intrinsic benefits such as health, also


offer instrumental value. I do not wish to discuss the validity of Bostrom’s claims here; however they offer a useful diagnostic tool for determining exactly which enhancements should be classified as broad spectrum or narrow focus. In the following sections I discuss the range of enhancements which should be publicly or privately funded with reference to Bostrom’s concept of positional and intrinsic benefit as well as the requirement that we maximize quality of life for our offspring.

**Broad Spectrum Enhancements**

There is a concern that by allowing genetic enhancement we also allow a further stratification on genetic grounds of our social institutions.\(^{160}\) I argued in the previous chapters that due to the validity of this concern, a just social model of HGE requires public funding of at least some kinds of enhancement technologies. Bostrom’s distinction between positional and intrinsic\(^{161}\) enhancements is helpful here as it offers guidance as to the range of those enhancements which we should encourage and those which we should merely allow. Those enhancements, such as improved health or longevity\(^{162}\) which offer benefits regardless of context should be subsidized,\(^{163}\) if not fully publicly funded in order to limit the potential for social stratification.\(^{164}\) A further consequence of a healthier or more intelligent population is that the greater the prevalence of individuals

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160 See chapter three.
with such enhancements, the greater the potential benefit to society. This is seen most easily in the case of individuals with an enhanced immune system, where the social benefit would be similar to that of a society with a high number of people who had been vaccinated against infectious diseases.\textsuperscript{165} Those enhancements that should be publicly funded are broad spectrum enhancements that will offer benefits to the enhanced individual regardless of context. Enhancements that merit public funding are those that would not restrict, or would positively enhance, an individual’s ability to pursue his or her life goals. Individuals who are genetically specialized may gain a benefit from being enhanced in such a way, but it is not the responsibility of the state to enable individuals to become genetically specialized for particular tasks. This is analogous to state funded general education or healthcare but not of highly specialized education or elective cosmetic surgery. A further requirement is that while enhancement should be publicly funded or subsidized, enhancement should not be obligatory, although it is reasonable to encourage those enhancements which have broad spectrum benefits.

**Narrow Focus Enhancements**

Positional\textsuperscript{166} or narrow focus enhancements are those that give only a competitive advantage to an individual rather than a broad spectrum benefit, as is the case of improved health or longevity. These kinds of enhancements offer a benefit regardless of context whereas narrow focus enhancements may only offer benefit in a limited range of

\textsuperscript{164} See chapters two and three.
contexts. Bostrom gives the example of stature as it has been shown statistically that in western cultures taller men are paid more and have more social influence.\(^{167}\) However, while being tall may be advantageous for tall people in a particular context it offers no intrinsic benefit such as being healthier or being able to process information more quickly. Further, to enhance our offspring to be taller represents a zero sum game whereby for someone to be the tallest someone else must lose out; there is therefore no general benefit, only shifts in positions of individuals.

While these enhancements do not immediately fall into the category of impermissible due to restrictions on quality of life,\(^{168}\) they nevertheless do not offer an intrinsic benefit to the individuals who are enhanced as they rely on a particular context in order for the enhancement to be beneficial. In the case of height, for example, the enhancement is only beneficial to a person in a social context where being tall is valued. Further, given the lack of benefit to society as a whole in having a population that is slightly taller, it seems that publicly funding such enhancements is a waste of public money\(^ {169}\) in a way that is not true of having a healthier, more intelligent population. In such a way, Bostrom argues\(^ {170}\) that it is appropriate not to encourage or subsidize positional, narrow focus enhancements, though they are, at least initially, not restrictive enough to merit an

\(^{166}\) Ibid: 501.

\(^{167}\) Ibid: 501.

\(^{168}\) Though it is possible, in the case of engineering for taller children for example, that at some point in the “genetic arms race”, further enhancements does cross the line into life limiting enhancements. For example, extremely tall people may find it difficult to use public transport that has been designed for people of “average” height.

outright prohibition on their use. In this case, while we should not publicly fund such enhancements, if people are willing to pay for them and if they can find a doctor willing to provide it, then they should be allowed to pursue it. While we may allow parents to enhance their children with narrow focus enhancements, this is analogous to the way parents are allowed discretion in the religious, social and leisure systems that they encourage their offspring to participate in. We do not restrict the range of concepts of the good that people are allowed to have. However, we should not permit state funding of these type of enhancements for the same reason we do not allow state control of the religious beliefs that people are allowed to have or of the people that they are allowed to socialize with, doing so would place unjust limits on personal liberty. In contrast, broad spectrum enhancements do not betray a similar bias, they are helpful regardless of which set of life goals that they are associated with.

While permitting privately funded narrow focus enhancements may lead to a limited version of the stratification of society that is feared by opponents to HGE, it seems reasonable to suggest that in this stratification would still put the worst off, those with only publicly available enhancements, in a better position than they would otherwise have been according to the maximin principle.171

Conclusion

There are many arguments against the pursuit of HGE, ranging from objections to the principle involved to fears about the potential consequences of a society where enhancement is available. I have shown that the deontological objections to HGE lead us to several implausible conclusions which overly restrict the range of entities that we owe moral consideration to. Further, I have argued that while the concerns raised over the potential consequences of HGE are worthy of consideration, they do not offer a conclusive justification for a blanket prohibition of genetic research or potential future enhancements. Arguments presented by advocates of disability rights also fail to take account of the valid interest that people have in not being disabled themselves and ignore the huge potential benefits to individuals in terms of improved health, longevity and intelligence that may be possible through HGE.

Due to the severe limitations on personal liberty and equality of opportunity that disease, disability and physical and mental deterioration through aging have on individuals, it is in our interest to pursue medical solutions to the impairments which exacerbate these conditions. Further, it is important that such enhancements be made available to all individuals at public expense in order not to unjustly limit the opportunity of those without the means to pay for enhancement themselves. While we must be cautious in our pursuit of new technologies, we should not be deterred from the pursuit of knowledge.

by abstract claims about the value of human nature or by unsubstantiated fears about what the future may bring.
Bibliography


72


