DESIGNING BABIES: MORALLY PERMISSIBLE WAYS TO MODIFY THE HUMAN GENOME

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ABSTRACT

My focus in this paper is the question of the moral acceptability of attempts to modify the human genome. Much of the debate in this area has revolved around the distinction between supposedly therapeutic modification on the one hand, and eugenic modification on the other. In the first part of the paper I reject some recent arguments against genetic engineering. In the second part I seek to distinguish between permissible and impermissible forms of intervention in such a way that does not appeal to the therapeutic/eugenic distinction. If I am right much of what we would intuitively call eugenic intervention will be morally acceptable. Central to my argument is an asymmetry in the way genetic engineers can influence a person’s capacities on the one hand and life-goals on the other. Forms of genetic intervention that have a high probability of producing a mismatch of life-goals and capacities will be ruled out.

The Human Genome Project is revealing the genetic bases of diseases such as muscular dystrophy, cystic fibrosis, and various cancers. This knowledge brings with it the hope of treatment by appropriately modifying a person’s DNA. The problem, as many see it, is that genetic manipulation might not be limited to disorders like the above. Characters such as intelligence, physical prowess,
sexual orientation and law abidingness are all genetically influenced. Considerably refined, the same techniques that might help eliminate the above diseases could be put to use building super intelligent people, exceptionally law abiding people, super capable production line workers, or a uniformly heterosexual population.

Most people want to draw a sharp dividing line between the two categories of genetic intervention. Genetic engineering which many would consider to be under some circumstances morally acceptable is called therapeutic. Roughly, this kind of engineering aims to remedy defects not present in normal humans. In the other category comes eugenic engineering. The goal of this kind of genetic manipulation is to produce individuals whose capacities go beyond the normal. Many people think that eugenic engineering ought never to be permitted. In the first part of this paper I will examine and reject a few of recent attempts to distinguish morally between various kinds of genetic engineering. I will then seek to draw a line between morally permissible and impermissible forms of genetic manipulation in such a way that does not coincide with the therapeutic/eugenic distinction. If I am right many forms of intervention that we would intuitively see as eugenic will be permissible.

THE RELATIONSHIP BETWEEN GENE AND PHENOTYPE
Before I proceed it will be important to say something about the relationship between a gene and a phenotypic character. A gene contributes to the production of a certain feature by producing a specific protein. The sum of my genes produce a collection of proteins which combine with environmental input to produce my body and brain.

We need more than this holistic relation. Researchers into the human genome are interested in understanding how particular genes can be for particular phenotypic characters. There are a number of ways in which writers have proposed that the relationship between a phenotypic character and a gene be captured. The analysis of genes for phenotypes I favour is the very liberal one

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pushed by Richard Dawkins and further elaborated by Kim Sterelny and Philip Kitcher.\(^5\) Theirs is a causal account focusing on phenotypic changes that genetic modifications produce against constant genomic and extra genomic backgrounds.\(^6\) According to them

\[\ldots\text{we can speak of genes for X if substitutions on a chromosome would lead, in the relevant environments, to a difference in the X-ishness of the phenotype.}\]

This analysis is an extremely powerful one. For example, it enables Dawkins to justify his claim that there is a gene for reading.\(^8\) I can read. There are changes that could be made to a gene of mine in a counterfactual history that preserved all the rest of my DNA and environment which would result in an individual that could not read. This way of understanding the gene/phenotype relationship does not lay itself open to the charge of genetic determinism. Though we can identify certain genes as having played a specific causal role in accounting for my ability to read, we can acknowledge that there are also a variety of changes which could be made to the environment of my developing, genetically identical twin which would result in someone who could not read.

The fact that there are many normal environments in which the genes we have identified do not produce people who read would tend to indicate that most interesting generalisations about reading are to be made in terms of environmental input. Effects of genes which are expressed across a very wide range of normal environments will be those that are best investigated by the gene researcher. Instead she might investigate some much wider spread capacity that underlies reading. The relationship between a specific set of genes and this underlying capacity will, in likelihood, prove to be more robust.

Genetic diseases can result when DNA of a gene at a specific locus on the genome is scrambled or deleted, resulting in the correct protein not being produced.\(^9\) In the past a defective gene was guessed at after discovering that a missing or abnormal protein was responsible for a certain inherited condition. Unfortunately, in many cases it is very hard to find the dysfunctional gene product for a condition which inheritance patterns seem to indicate is genetic.


\(^6\) An organism's genome is the complete genetic complement of that organism.


\(^8\) Dawkins, *The Extended Phenotype*, p. 23.

\(^9\) A locus is a gene's location on a chromosome.
The Human Genome Project is built on the reversal of this process, allowing the gene to be targeted directly. The genetic deletion or scrambling that sufferers of a specific disease have is isolated, allowing the structure of the absent or aberrant protein to be determined. In the early years progress was unexpectedly rapid. Genes for Huntington disease, muscular dystrophy and cystic fibrosis, amongst others, were found. In these cases there seems a fairly straightforward correlation between a certain mutant gene and the disorder. However, despite much trumpeting in newspapers the quest for genes for such diseases as manic depression and alcoholism has been more troubled.\textsuperscript{10} There are two reasons why this is the case. First, unlike many of the monogenic, or single gene diseases, alcoholism and manic depression will be polygenic. Many genes will contribute to them. Further, the genetic component of these conditions appears multiply realisable. Conditions that current medical science groups together may have a number of very different genetic causes. Despite difficulties like these, progress has still been considerable. The recent production of an albeit hole-riddled map of the entire human genome in Paris promises to provide a framework against which genes for traits can be more easily located.\textsuperscript{11}

The future promises a range of genetic cures for hitherto untreatable conditions. As the genome is lain bare and techniques for inserting DNA into human cells are refined, the hope is that doctors might one day routinely treat by replacing a defective gene with a healthy one.\textsuperscript{12} As the Human Genome Project moves forward the genes which control characteristics such as intelligence may be exposed. If this is so, then less-than-Einsteinian intelligence might be treated in much the same way as cystic fibrosis. There seems a very big difference between the two cases. Can we find moral grounds for making a distinction?

There are some varieties of genetic manipulation that a broadly consequentialist approach will reveal are clearly impermissible.\textsuperscript{13}


\textsuperscript{12} This treatment might be germ-line or somatic. See footnote one.

\textsuperscript{13} I will not discuss concerns about the identity of the resulting person, which have been well covered in Jeffrey Kahn, “Genetic Harm: Bitten by the Body that Keeps You?”, \textit{Bioethics}, 5:4, 1991, pp. 289–309 and Robert Elliot, “Identity and the Ethics of Gene Therapy”, \textit{Bioethics}, 7:1, 1993, pp. 27–40.
Tampering with the DNA of a person in such a way as to cause cystic fibrosis or cancer will be straightforwardly ruled out. Intervention that has patently bad consequences for society, such as the creation of super intelligent, super strong, psychopathic individuals, or the attempt to do a Jurassic Park on genetic material extracted from fragments of Hitler's skull will be impermissible. Clearly we should also frown upon genetic tampering where we do not know all the implications for the body or phenotype with a high degree of certainty. This is complicated by the fact that genes are pleiotrophic; they have more than one effect on the phenotype. If a genetic engineer is only aware of a proper subset of the total effects of a gene then directed and controlled modification of one effect will cause uncontrolled or random change to another of the gene's effects. Evolutionists have long known that the vast majority of random changes to DNA result in phenotypic changes which are deleterious to the organism. Genetic engineers cannot afford to approach design with the same attitude to wastage as nature.

AN ACROSS THE BOARD ARGUMENT AGAINST GENETIC THERAPY

Many predict dire consequences for society from almost any systematic eugenic modification. Early eugenic intervention is likely to be very expensive. This means it will only be available to the wealthy. One fairly representative example of this reasoning can be found in Jerry Bishop and Michael Waldholz. They say

It wouldn't take many generations of this discriminatory genetic selection to produce an ever-widening gap between the upper and lower strata of society. [...] [A] society in which a butcher's son has little opportunity to be anything but a butcher and an executive's child is born to be an executive may not seem unreal as it might seem today.

Given the analysis of genes "for" appealed to above, being an executive or a butcher will be highly non robust effects of genes. There will be many normal environments in which what we might want to call the butcher gene or the executive gene will not have

15 The existence of pleiotropy does not represent an in principle barrier to genetic engineering. Nature overcomes linked deleterious pleiotrophic effects by means of suppressor genes. (See Dawkins, The Extended Phenotype, chapter 2). Sufficiently sophisticated genetic engineers might also use such genes.
16 Bishop and Waldholz, Genome, p. 322.
these effects. It seems more likely that some of the intellectual, emotional and physical capacities that permit one to become a butcher or executive will be more robust effects of genes.

The prospect that the benefits of eugenic genetic enhancement might be unfairly distributed is of concern. I don’t think that the risk should provoke an across the board restriction. Richard Lewontin points to a common mistake amongst writers on the Human Genome Project. Much of the language seems very genetic determinist. Some talk as if it is DNA alone that creates the phenotype. Genes alone produce nothing; only in combination with environmental input is an organism built. Understanding the nature of the impact of these two kinds of input on the phenotype has interesting consequences for many arguments which attempt to trade on the specialness of genetic manipulation. Improving the genotype of a person might boost the quality of that person’s phenotype. However, much systematic and socially divisive improving of the phenotype already occurs as a result of varying qualities of environmental input. Environmental input combines with genetic input in a fairly prescribed fashion to make a functioning heart. Boosting the quality of either kind of input might produce a better functioning heart. We see the effects of differing qualities of environmental input in the levels of function of all human organs everywhere. The differences in average life-spans between the nutritionally impoverished and the nutritionally wealthy are considerable. This is especially noticeable when we compare first and third world inhabitants; a fairly close correlation exists between average life expectancy and per capita GDP. Differing levels of educational and medical input from socio-economic group to socio-economic group within the one society result in the kinds of gap opponents of eugenic engineering fear. These disparities are almost as heritable as genetic differences.

Genetic tampering might be considered to be more dangerous through producing disparities that are greater than those that could be produced through changing the quality of environmental input. Our basic genetic makeup limits us to a certain upper limit of intelligence and physical ability. The right modified genotype

17 Lewontin, “The Dream of the Human Genome”.

18 John Harris, Wonderwoman and Superman, chapter 7 and “Is Gene Therapy a form of Eugenics?” Bioethics, 7:2/3, pp. 178—187 places modifications achieved by genetic manipulation along side those produced by environment modification and convincingly urges a parity of moral reasoning about them.

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[282x642]together with the right kinds of environmental input might produce an organism of almost unbounded intelligence and physical ability. This may, in principle, be true, but I think that the kinds of proposals for eugenic engineering that we may face in the near future will not pose these kinds of problems. A major obstacle relates to the unpredictable pleiotropic effects of an invented gene. We know about any additional effects of a gene that protects against cystic fibrosis because nature has "tested" this gene in other humans. We could not say this for new super intelligence genes.

So, in regard to the generation social inequality, genetic engineering presents problems that are not different in kind to those posed by differing environmental influences. Adding the potential for genetically produced disparities to already existing environmentally produced disparities does promise to compound the problem. However, the same kinds of moral remedies that ought to apply when we work out how to share out familiar environmental resources can be assumed to apply when we come to resources required for the manipulation of DNA. Resources necessary for eugenic engineering will much less likely to be mistaken for limitless than those on the environmental side of the equation, requiring special attention that they not all be gobbled up by one group of people. Many moral theories might be wheeled in to do the work here. Some will permit me to show some kind of special regard for those who are close to me whilst demanding that I show some concern for those who are not.20 Principles like this will apply equally in apportioning more familiar environmental resources and resources for genetic manipulation.21

SOME ATTEMPTS TO DRAW A DISTINCTION

Some writers are not tempted by across-the-board arguments. They allow that genetic therapy is permissible under some circumstances. Jeffrey Kahn argues that some genetic conditions can be seen as "on-balance harmful", bringing with them a duty of treatment.

If genetic disposition affects interests such that the state is on-balance harmful, gene therapy could be justified as avoiding the future harms genetic disposition holds, with reference to

20 Allowing special consideration to those who are close to us is more familiar from deontological theories. However see Frank Jackson, "Decision-theoretic Consequentialism and the Nearest and Dearest Objection", Ethics, 101:3, 1991, pp. 461–482 for a consequentialist argument in favour of special consideration.

21 Singer and Wells, The Reproduction Revolution goes into detail on the kinds of measures which might be taken to ensure that the benefits of genetic engineering are relatively evenly spread.

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obligations to avoid harm growing out of the principle of nonmaleficence.  

Eugenic manipulation is not directed against conditions which are on-balance harmful. This means that no similar requirement for their treatment exists.

If the determination is that genetic disposition adversely affects interests but that the state is not on-balance harmful, gene therapy would only be justifiable based not in avoiding harm but in providing benefit, growing out of the more tenuous moral arguments in support of obligations of positive beneficence.

"Tenuous moral arguments in support of obligations of positive beneficence" may fail to show that genetic manipulation that does not seek to remedy harm to be morally required, but is this the same as showing that it is morally impermissible? Turn again to the parallel I drew between the moral significance of genetic and environmental input. There are clearly environmental influences which are on-balance harmful, and therefore must be avoided. Excessive use of pesticide in parts of what was once the Soviet Union has resulted in children with five times the morbidity of those living in relatively unaffected areas. Efforts to reduce this level would be correcting an influence which is on-balance harmful. Some environmental influences such as after school Japanese lessons are not targeted at conditions which are on-balance harmful. No obligations of positive beneficence will show that they are morally required. Surely we shouldn’t conclude that they are morally impermissible.

What feature would make genetic manipulation special in this regard, so that an act’s not being morally required equates to that act’s being morally impermissible? Parents certainly go further in apportioning environmental input than the mere avoidance of harm. Why shouldn’t they, given the provisos I discuss above, do the same with genetic input?

Some fear that certain kinds of genetic engineering might debase the traits that we currently value. Patricia Greenspan puts an argument along these lines, focusing on genetic engineering targeted at psychological features such as self control. Even if no immediate threat to free will is posed, Greenspan thinks that genetic engineering diminishes "the value we place on freedom as self control.

22 Kahn, "Genetic Harm", p. 306.
23 Ibid., pp. 306—307.
She favours an Aristotelian picture of character formation according to which traits that make up the character are, in large parts, the results of rational evaluation and training by the agent. According to Greenspan genetic engineering of character traits stands to undermine Aristotelian character training in the same way that science fiction psycho-surgery might. We would value traits produced in such a way as we value weight control by shrinking of the stomach.

The sort of temperance achieved thereby would not seem to have quite the same status as a virtue insofar as it would not involve genuine responsiveness to the dictates of reason. The connection between the deliberative processes the led the agent to submit to the operation and his later, more moderate appetite for food would be misdescribed as a case of “listening to reason” . . .

I think that genetic intervention has quite different consequences from psycho-surgery for character formation. Psycho-surgery on a person’s character cuts in on the processes that constitute rational character formation. Any resulting self control need depend in no way on that person’s earlier character forming processes. No similar hiatus is required by the genetic engineer. Consider an example pertinent to Greenspan’s argument. Researchers suspect that an enhanced sensitivity to dopamine may be partially responsible for the lack of self control associated with some forms of alcoholism.

This heightened sensitivity is supposed to cause a greater feeling of reward on imbibing alcohol. The aim of genetic engineers might be to replace the, in utero, gene that predisposes a person to this enhanced sensitivity with the gene that non alcoholics possess. The individuals that resulted would be much more likely to exhibit self control in respect of alcohol. This self control would be, in large part, due to genetic engineering. It is important to note that someone who underwent this kind of genetic intervention would be no different in regard to rational character formation from those who started with the normal gene. The changes that are most likely to be proposed, the replacement one gene with another that is prevalent in the population, will result in a biasing of character development that is compatible with the Aristotelian picture. Even more extreme cases need not pose a threat to character formation. Genetic engineering is unlikely to be able to give a parent Tolstoys

26 Ibid., p. 42.
27 See Bishop and Waldholz, Genome, chapter 7 for discussion.
for children. It might give them children with the genetic makeup of Tolstoy. This is only the beginning of the story. A particular genetic makeup may be necessary for Tolstoy-like talent, but it will not be sufficient. As occurred in Tolstoy's case, there is plenty of scope for the right kind of character and personality formation.

IMPERMISSIBLE KINDS OF GENETIC MANIPULATION

Though many forms of manipulation of the genes that underlie personality may pose no threat to the self control, many will see a problem in the idea of another person's intentions lying behind the production of the mechanisms that generate my intentions. There doesn't seem to be much difference for me if a given psychological feature, be it good or bad, is the result of the random juggling of genes in the formation of my parents' sex cells which then come together to produce my genotype, or are the consequences of the intervention of another person. In the second set of circumstances I may have someone to blame, but that will not make any condition that ails me better or worse.

In what follows I will argue that a relative of this point might carry force in an argument for restricting certain kinds of genetic therapy. The argument will hinge on an asymmetry in the way a person's goals on the one hand, and that same person's capacities on the other, can be influenced by way of genetic engineering. My argument depends on a certain idealised picture of human psychology and the relationship between goals and capacities. I hope it is close enough to the truth in important respects for the conclusions I draw from it to be translatable to the real world.

A good life is had when a person's important or life-goals are matched by her capacities. There will obviously be some interaction between goals and capacities. Capacities can be shaped by goals. Certain goals will not survive long in a person who lacks the required raw capacities. Despite this, much input that goes into our capacities does not pass via our goals, and vice versa. Life-goals are often formed in relative ignorance about one's capacities. Often, even recognising that one has been born with a certain range of raw capacities will not suffice to produce an appropriate goal.

In a certain environment, there will no doubt be a genotype coding for the set of raw capacities which best enable a person to pursue a given goal. Most people will make do with only a small subset of this ideal package of raw capacities. It is significant that raw capacities appropriate for some goals will be incompatible with those required for other goals. The drive the ideal merchant banker requires will be incompatible with the reflection needed to be a great

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poet or the patience of the perfect file sorter. The best body build for a rugby player will not suit a basketballer. A set of genes necessary for rugged individualism valued in Western societies might work against a set of genes which predisposes a person to a high sense of community responsibility, more prized in Asian societies. In what follows I am going to suggest that a difference in the ability of genetic engineers to influence raw capacities and goals ought to rule out certain kinds of intervention.

I start with what I hope are a couple of fairly uncontroversial empirical claims. A moderate adaptationist holds that many, but certainly not all, traits of an organism are adaptations. They exist now because they boosted the inclusive fitness of the organism’s ancestors. We recognise an adaptation by its complex design, its species typicality and its capacity to play some fitness enhancing role for an organism in the environments its ancestors have occupied. Natural selection works by harnessing genes for these traits, causing them to spread throughout the population. Why tell this relatively well known story about natural selection? I think that there is an interesting connection between phenotypic properties that might be targeted by genetic engineers, adaptations and the nature of genetic input.

Keeping the Sterelny/Kitcher analysis of genes for phenotypes in mind, we can distinguish between fine-tuning and all-or-nothing genes for a trait. First, we need to make a distinction. Changes to the genes that control heart development determine, with others, whether or not there is a brain at all. They are all-or-nothing genes for the brain. These genes do not govern the fine tuning of a person’s intellect. In order for a gene to be a fine-tuning gene there must be a fairly reliable correlation of specific small genetic modifications with phenotypic effects in a range of environments in which humans happen to find themselves. These fine-tuning genes for a trait will be important for what I say below.

I think that very many of the capacities that genetic engineers will seek to enhance will be adaptations. Many of the things that people would like to do better they already do quite well. They want to think better, run faster, jump higher and so on. This, “doing quite well” is a sign of the complex design that is a hallmark of adaptation. A person might wish to have the ability to look into the future, or lift objects by telekinesis, but since these are things that we can’t do at


29 Inclusive fitness is a measure of fitness which includes an organism’s relatives to the degree which they are related.

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all, it would be exceedingly difficult to work out which genes to manipulate. Indeed, if they are physical impossibilities then no such genes could ever be found.

Of course, none of this means that the goals that natural selection had in designing these traits will be at the forefront of a genetic engineer’s mind in enhancing them. As we saw, the boosting of the inclusive fitness of an organism is nature’s goal. Intelligence presumably serves nature’s ends by enabling the organism to find a mate with the optimal genetic makeup, and allowing the protection of offspring so that they can go on to reproduce. Intelligence enables us to pursue goals which may be irrelevant to our inclusive fitness; the selection of the right chess openings, the interpretation of Latin jokes, and so on. A person may well desire these traits at levels that are injurious to inclusive fitness. Genius in a particular skill may result in the obsessive pursuing of projects relating to it, to the exclusion of having or appropriately caring for offspring.

The fact that the traits that serve nature’s goals also serve different human goals will help the genetic engineer. Assuming evolutionary gradualism we can guess that there will be a collection of fine-tuning genes originally used by nature to construct the trait in question. These genes will be the ones that will be modified in the careful and gradual enhancement of the trait.

I suggested above that our goals are very often not nature’s goals. If this is so then human goals will often not be adaptations. There may be some doubt here. Sociobiologists talk about natural selection of mechanisms that have causal impact on the formation of a person’s goals. As in the case of capacity-adaptations, the biological goals these human goal producing mechanisms have is the promotion of the organism’s inclusive fitness by ensuring that it finds mates of a certain kind, and is disposed to care for its offspring. We must distinguish what we half metaphorically call nature’s goal in designing a piece of psychological machinery, from the human life-goals that it might play a role in generating. Modern people in modern environments acquire, partially with the help of these mechanisms, a wide range of aims. Many of these human goals contribute to our genes’ goals; some do not. Amongst those that do not is the desire to become a nun. Even excluding these there is a very wide range amongst those that do. Becoming a lawyer, or a tennis player may both be ways of contributing to our inclusive fitness, produced by the same selected mechanisms. If

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sociobiologists are right, then it will be no accident that good lawyers and tennis players have high inclusive fitness. Yet, they are very different goals from our point of view, requiring very different combinations of capacities. Even human goals which seem very close to nature's targets are importantly different in so far as they involve capacities. Many humans desire to have and care for children. In doing so they do not view them exclusively as bearers of their genes. Much of what goes into caring for children may have no obvious direct impact on their reproductive fitness.

The fact that specific human goals are not themselves adaptations means that we cannot count on there being fine tuning genes for them. Fine-tuning genes may account for the fact that a person typically chooses inclusive fitness enhancing life-goals. However, they probably will not account for the differences between the possibly equally inclusive fitness enhancing goals of being a good lawyer or tennis player. Clearly there will be a number of all-or-nothing genes for goals. There are many loci on the human genome, changes to which will result in creatures with no goals at all. Certain genetic modifications may even produce small changes to particular goals in specific environments. However, in this case, we have no reason to believe that there will be a reliable correlation between gene and fine phenotypic detail across normal human environments. If sociobiologists are right about the pervasive influence of natural selection on our minds and behaviour then there may be very few environments which would produce large numbers of humans whose life-goals never boost their inclusive fitness. Despite this, it is very likely that a person's social environment does the fine-tuning work in deciding which of these, from our points of view very different fitness enhancing goals, we adopt. When we get to those, perhaps rare, life-goals which tend to decrease a person's fitness the role of the social environment in fine-tuning will be clearer.

If this is so, then prospects for directed modification of capacities are much better than for goals. I think that all of this will have important consequences for the kinds of genetic therapy directed at capacity enhancement that we should permit. There are two kinds of change we might make. We might enhance a person's capacities so as to expand the cone of possibilities for her. Here, we attempt to list the whole range of morally acceptable human goals and aim to provide capacities which better enable a person to pursue them in such a way that does not discriminate between them. I think that this

Oxford University Press, 1992 present more sophisticated "Darwinian psychological" formulations.

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kind of ecumenical enhancement is, given the provisos discussed earlier in this paper, permissible.

There is a second kind of intervention which is more choosy. Rather than broadly enhancing in a way that rules out nothing beforehand, it aims to produce a collection of raw capacities that is the optimal set for a specific set of goals. In doing this, given the conflict of capacities relevant to different goals, we eliminate options. Of course, the elimination of options is an unavoidable part of settling on the goals that will rule our lives. If this occurs in a way that is sensitive to a person's goals there is no harm. The problem is that the fine tuning of goals will probably occur during a person's lifetime. So the elimination of options by genetic intervention will, very likely, not be accompanied by a corresponding directing of goals. In all likelihood we will end up with people whose capacities doom them to a life for which they have no passion.

What I say above can be applied to the complaint that eugenic engineering is likely to be culturally tainted. Will widespread genetic intervention result in the correcting of everyone's genotype to "an ideal 'white, Judeo-Christian, economically successful' genotype"? No, because, even within Western culture there are morally acceptable goals which do not revolve around, and indeed would be harmed by, these qualities. I think that there are some kinds of genetic enhancements which are as clearly interculturally desirable as lack of cystic fibrosis and muscular dystrophy. Enhanced intelligence or physical agility are examples. By contrast, it is hard to imagine a worthwhile option for which an absolute prerequisite is being completely unintelligent and totally physically immobile. The restrictions I have argued for above would prevent the inscription of ideals peculiar to one culture in the genes of all. In taking the effort to screen off from my values those qualities that are peculiar to my way of life, I should also screen off those qualities that are peculiar to my culture. There are clearly morally acceptable options which are opened to a person through being enculturated in a different way. So, genetic barriers to a person's being differently enculturated will not be permissible. Further, an ability to be part of one community and able to understand another very different community may be central to many morally laudatory life-plans. This understanding is already made difficult by the contrasting environmental influences from culture to culture. People are already shaped to a considerable degree by their cultures. These projects would clearly be harmed if the boundaries between members of

^31 Quoted in Bishop and Waldholz, Genome, p. 305.
different cultures were made even greater through the inscription of cultural values into their genotypes.

Its newness and strangeness incline many to want to build an ethical bogey out of genetic engineering. We are much more familiar with attempts to modify people by modifying their environments. In this paper I have criticised arguments which have attempted to say about genetic manipulation what we have no disposition to say about environmental manipulation. The near causal parity ought to bring with it some kind of moral parity. If what I have said in the immediately preceding paragraphs is right, then concern about genetic enhancement of a certain type is a particularly dangerous manifestation of a more general concern about ways an individual can be shaped by others. The worry I have told about certain kinds of genetic tampering is a relative of more familiar concern about ways of modifying a child’s environmental input. I am talking here about parents who attempt aggressively to shape a child’s capacities in a way that is appropriate to their own life-goals. Parents can place children in environments in which certain of their raw capacities are likely to be shaped in certain ways. Not all the fine-tuning influences which feed into life-goals are in a parent’s hands however. As in the case of certain forms of genetic engineering, the problem does not reside so much in the influencing of a person’s capacities by another, but in their being influenced in such a way that narrows rather than widens the range of morally acceptable possibilities for that person.

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