

# What Sort of People Should There Be?

by Jonathan Glover (1984)

---

## Chapter 2: Questions About Some Uses of Genetic Engineering

... There is a widespread view that any project for the genetic improvement of the human race ought to be ruled out: that there are fundamental objections of principle. The aim of this discussion is to sort out some of the main objections. It will be argued that our resistance is based on a complex of different values and reasons, none of which is, when examined, adequate to rule out in principle this use of genetic engineering. The debate on human genetic engineering should become like the debate on nuclear power: one in which large possible benefits have to be weighed against big problems and the risk of great disasters. The discussion has not reached this point, partly because the techniques have not yet been developed. But it is also partly because of the blurred vision which fuses together many separate risks and doubts into a fuzzy-outlined opposition in principle.

### 1. Avoiding the Debate About Genes and the Environment

In discussing the question of genetic engineering, there is everything to be said for not muddling the issue up with the debate over the relative importance of genes and environment in the development of such characteristics as intelligence. ...

The nature-nurture dispute is generally seen as an argument about the relative weight the two factors have in causing differences within the human species: 'IQ is 80 percent hereditary and 20 per cent environmental' versus 'IQ is 80 percent environmental and 20 percent hereditary'. No doubt there is some approximate truth of this type to be found if we consider variations within a given population at a particular time. ...

We can avoid this dispute because of its irrelevance. ... In other words, to take genetic engineering seriously, we need take no stand on the relative importance or unimportance of genetic factors in the explanation of the present range of individual differences found in people. We need only the minimal assumption that different genes could give us different characteristics. To deny that assumption you need to be the sort of person who thinks it is only living in kennels which makes dogs different from cats.

### 2. Methods of Changing the Genetic Composition of Future Generations

There are essentially three ways of altering the genetic composition of future generations. The first is by environmental changes. Discoveries in medicine, the institution of a National Health Service, schemes for poverty relief, agricultural changes, or alterations in the tax position of large families, all alter the selective pressure on genes. It is hard to think of any social change which does not make some difference to who survives or who is born.

The second method is to use eugenic policies aimed at altering breeding patterns or patterns of survival of people with different genes. Eugenic methods are 'environmental' too: the difference is only that the genetic impact is intended. Possible strategies range from various kinds of compulsion (to have more children, fewer children, or no children, or even compulsion over the choice of sexual partner) to the completely voluntary (our present genetic counselling practice of giving prospective parents information about probabilities of their children having various abnormalities).

The third method is genetic engineering: using enzymes to add to or subtract from a stretch of DNA.

Most people are unworried by the fact that a side-effect of an environmental change is to alter the gene pool, at least where the alteration is not for the worse. And even in cases where environmental factors increase the proportion of undesirable genes in the pool, we often accept this. Few people oppose the National Health Service, although setting it up meant that some people with genetic defects, who would have died, have had treatment enabling them to survive and reproduce. On the whole, we accept without qualms that much of what we do has genetic impact. Controversy starts when we think of aiming deliberately at genetic changes, by eugenics or genetic engineering. ...

The main reason for casting the discussion in terms of genetic engineering rather than eugenics is not a practical one. Many eugenic policies are open to fairly straightforward moral objections, which hide the deeper theoretical issues. Such policies as compulsory sterilization, compulsory abortion, compelling people to pair off in certain ways, or compelling people to have more or fewer children than they would otherwise have, are all open to objection on grounds of overriding people's autonomy. Some are open to objection on grounds of damage to the institution of the family. And the use of discriminatory tax and child-benefit policies is an intolerable step towards a society of different genetic castes.

Genetic engineering need not involve overriding anyone's autonomy. It need not be forced on parents against their wishes, and the future person being engineered has no views to be overridden. (The view that despite this, it is still objectionable to have one's genetic characteristics decided by others, will be considered later.) Genetic engineering will not damage the family in the obvious ways that compulsory eugenic policies would. Nor need it be encouraged by incentives which create inequalities. Because it avoids these highly visible moral objections, genetic engineering allows us to focus more clearly on other values that are involved. ...

Let us now turn to the question of what, if anything, we should do in the field of human genetic engineering.

### 3. The Positive-Negative Distinction

We are not yet able to cure disorders by genetic engineering. But we do sometimes respond to disorders by adopting eugenic policies, at least in voluntary form. Genetic counselling is one instance, as applied to those thought likely to have such disorders as Huntington's chorea. This is a particularly appalling inherited disorder, involving brain degeneration, leading to mental decline and lack of control over movement. It does not normally come on until middle age, by which time many of its victims would in the normal course of things have had children. Huntington's chorea is caused by a dominant gene, so those who find that one of their parents has it have themselves a 50 per cent chance of developing it. If they do have it, each of their children will in turn have a 50 per cent chance of the disease. The risks are so high and the disorder so bad that the potential parents often decide not to have children, and are often given advice to this effect by doctors and others.

Another eugenic response to disorders is involved in screening-programmes for pregnant women. When tests pick up such defects as Down's syndrome (mongolism) or spina bifida, the mother is given the possibility of an abortion. The screening-programmes are eugenic because part of their point is to reduce the incidence of severe genetic abnormality in the population.

These two eugenic policies come in at different stages: before conception and during pregnancy. For this reason the screening-programme is more controversial, because it raises the issue of abortion. Those who are sympathetic to abortion, and who think it would be good to eliminate these disorders will be sympathetic to the programme. Those who think abortion is no different from killing a fully developed human are obviously likely to oppose the programme. But they are likely to feel that elimination of the disorders would be a good thing, even if not an adequate justification for killing. Unless they also disapprove of contraception, they are likely to support the genetic-counselling policy in the case of Huntington's chorea.

Few people object to the use of eugenic policies to eliminate disorders, unless those policies have additional features which are objectionable. Most of us are resistant to the use of compulsion, and those who oppose abortion will object to screening-programmes. But apart from these other moral objections, we do not object to the use of eugenic policies against disease. We do not object to advising those likely to have Huntington's chorea not to have children, as neither compulsion nor killing is involved. Those of us who take this view have no objection to altering the genetic composition of the next generation, where this alteration consists in reducing the incidence of defects.

If it were possible to use genetic engineering to correct defects, say at the foetal stage, it is hard to see how those of us who are prepared to use the eugenic measures just mentioned could object. In both cases, it would be

pure gain. The couple, one of whom may develop Huntington's chorea, can have a child if they want, knowing that any abnormality will be eliminated. Those sympathetic to abortion will agree that cure is preferable. And those opposed to abortion prefer babies to be born without handicap. It is hard to think of any objection to using genetic engineering to eliminate defects, and there is a clear and strong case for its use.

But accepting the case for eliminating genetic mistakes does not entail accepting other uses of genetic engineering. The elimination of defects is often called 'negative' genetic engineering. Going beyond this, to bring about improvements in normal people, is by contrast 'positive' engineering. (The same distinction can be made for eugenics.)

The positive-negative distinction is not in all cases completely sharp. Some conditions are genetic disorders whose identification raises little problem. Huntington's chorea or spina bifida are genetic 'mistakes' in a way that cannot seriously be disputed. But with other conditions, the boundary between a defective state and normality may be more blurred. If there is a genetic disposition towards depressive illness, this seems a defect, whose elimination would be part of negative genetic engineering. Suppose the genetic disposition to depression involves the production of lower levels of an enzyme than are produced in normal people. The negative programme is to correct the genetic fault so that the enzyme level is within the range found in normal people. But suppose that within 'normal' people also, there are variations in the enzyme level, which correlate with ordinary differences in tendency to be cheerful or depressed. Is there a sharp boundary between 'clinical' depression and the depression sometimes felt by those diagnosed as 'normal'? Is it clear that a sharp distinction can be drawn between raising someone's enzyme level so that it falls within the normal range and raising someone else's level from the bottom of the normal range to the top?

The positive-negative distinction is sometimes a blurred one, but often we can at least roughly see where it should be drawn. If there is a rough and ready distinction, the question is: how important is it? Should we go on from accepting negative engineering to accepting positive programmes, or should we say that the line between the two is the limit of what is morally acceptable?

There is no doubt that positive programmes arouse the strongest feelings on both sides. On the one hand, many respond to positive genetic engineering or positive eugenics with Professor Tinbergen's thought: 'I find it morally reprehensible and presumptuous for anybody to put himself forward as a judge of the qualities for which we should breed.'

But other people have held just as strongly that positive policies are the way to make the future of mankind better than the past. Many years ago H. J. Muller expressed this hope:

And so we foresee the history of life divided into three main phases. In the long preparatory phase it was the helpless creature of its environment, and natural selection gradually ground it into human shape. In the second—our own short transitional phase—it reaches out at the immediate environment, shaking, shaping and grinding to suit the form, the requirements, the wishes, and the whims of man. And in the long third phase, it will reach down into the secret places of the great universe of its own nature, and by aid of its ever growing intelligence and cooperation, shape itself into an increasingly sublime creation—a being beside which the mythical divinities of the past will seem more and more ridiculous, and which setting its own marvellous inner powers against the brute Goliath of the suns and the planets, challenges them to contest.

The case for positive engineering is not helped by adopting the tones of the mad scientist in a horror film. But behind the rhetoric is a serious point. If we decide on a positive programme to change our nature, this will be a central moment in our history, and the transformation might be beneficial to a degree we can now scarcely imagine. The question is: how are we to weigh this possibility against Tinbergen's objection, and against other objections and doubts?

For the rest of this discussion, I shall assume that, subject to adequate safeguards against things going wrong, negative genetic engineering is acceptable. The issue is positive engineering. I shall also assume that we can ignore problems about whether positive engineering will be technically possible. Suppose we have the power to choose people's genetic characteristics. Once we have eliminated genetic defects, what, if anything, should we do with this power? ...

#### **4. The View That Overall Improvement is Unlikely or Impossible**

There is one doubt about the workability of schemes of genetic improvement which is so widespread that it would be perverse to ignore it. This is the view that, in any genetic alteration, there are no gains without compensating losses. On this view, if we bring about a genetically based improvement, such as higher intelligence, we are bound to pay a price somewhere else: perhaps the more intelligent people will have less resistance to disease, or will be less physically agile. If correct, this might so undermine the practicability of applying eugenics or genetic engineering that it would be hardly worth discussing the values involved in such programmes.

This view perhaps depends on some idea that natural selection is so efficient that, in terms of gene survival, we must already be as efficient as it is possible to be. If it were possible to push up intelligence without weakening some other part of the system, natural selection would already have done so. But this is a naïve version of evolutionary theory. In real evolutionary theory, far from the genetic status quo always being the best possible for a given

environment, some mutations turn out to be advantageous, and this is the origin of evolutionary progress. If natural mutations can be beneficial without a compensating loss, why should artificially induced ones not be so too?

It should also be noticed that there are two different ideas of what counts as a gain or a loss. From the point of view of evolutionary progress, gains and losses are simply advantages and disadvantages from the point of view of gene survival. But we are not compelled to take this view. If we could engineer a genetic change in some people which would have the effect of making them musical prodigies but also sterile, this would be a hopeless gene in terms of survival, but this need not force us, or the musical prodigies themselves, to think of the change as for the worse. It depends on how we rate musical ability as against having children, and evolutionary survival does not dictate priorities here.

The view that gains and losses are tied up with each other need not depend on the dogma that natural selection *must* have created the best of all possible sets of genes. A more cautiously empirical version of the claim says there is a tendency for gains to be accompanied by losses. John Maynard Smith, in his paper on 'Eugenics and Utopia', takes this kind of 'broad balance' view and runs it the other way, suggesting, as an argument in defence of medicine, that any loss of genetic resistance to disease is likely to be a good thing: 'The reason for this is that in evolution, as in other fields, one seldom gets something for nothing. Genes which confer disease-resistance are likely to have harmful effects in other ways: this is certainly true of the gene for sickle-cell anaemia and may be a general rule. If so, absence of selection in favour of disease resistance may be eugenic.'

It is important that different characteristics may turn out to be genetically linked in ways we do not yet realize. In our present state of knowledge, engineering for some improvement might easily bring some unpredicted but genetically linked disadvantage. But we do not have to accept that there will in general be a broad balance, so that there is a presumption that any gain will be accompanied by a compensating loss (or Maynard Smith's version that we can expect a compensating gain for any loss). The reason is that what counts as a gain or loss varies in different contexts. Take Maynard Smith's example of sickle-cell anaemia. The reason why sickle-cell anaemia is widespread in Africa is that it is genetically linked with resistance to malaria. Those who are heterozygous (who inherit one sickle-cell gene and one normal gene) are resistant to malaria, while those who are homozygous (whose genes are both sickle-cell) get sickle-cell anaemia. If we use genetic engineering to knock out sickle-cell anaemia where malaria is common, we will pay the price of having more malaria. But when we eradicate malaria, the gain will not involve this loss. Because losses are relative to context, any generalization about the impossibility of overall improvements is dubious.

## 5. The Family and Our Descendants

Unlike various compulsory eugenic policies, genetic engineering need not involve any interference with decisions by couples to have children together, or with their decisions about how many children to have. And let us suppose that genetically engineered babies grow in the mother's womb in the normal way, so that her relationship to the child is not threatened in the way it might be if the laboratory or the hospital were substituted for the womb. The cruder threats to family relationships are eliminated.

It may be suggested that there is a more subtle threat. Parents like to identify with their children. We are often pleased to see some of our own characteristics in our children. Perhaps this is partly a kind of vanity, and no doubt sometimes we project on to our children similarities that are not really there. But, when the similarities do exist, they help the parents and children to understand and sympathize with each other. If genetic engineering resulted in children fairly different from their parents, this might make their relationship have problems.

There is something to this objection, but it is easy to exaggerate. Obviously, children who were like Midwich cuckoos, or comic-book Martians, would not be easy to identify with. But genetic engineering need not move in such sudden jerks. The changes would have to be detectable to be worth bringing about, but there seems no reason why large changes in appearance, or an unbridgeable psychological gulf, should be created in any one generation. We bring about environmental changes which make children different from their parents, as when the first generation of children in a remote place are given schooling and made literate. This may cause some problems in families, but it is not usually thought a decisive objection. It is not clear that genetically induced changes of similar magnitude are any more objectionable.

A related objection concerns our attitude to our remoter descendants. We like to think of our descendants stretching on for many generations. Perhaps this is in part an immortality substitute. We hope they will to some extent be like us, and that, if they think of us, they will do so with sympathy and approval. Perhaps these hopes about the future of mankind are relatively unimportant to us. But, even if we mind about them a lot, they are unrealistic in the very long term. Genetic engineering would make our descendants less like us, but this would only speed up the natural rate of change. Natural mutations and selective pressures make it unlikely that in a few million years our descendants will be physically or mentally much like us. So what genetic engineering threatens here is probably doomed anyway. ...

## 8. Risks and Mistakes

... One of the objections [to genetic engineering] is that serious risks may be involved.

Some of the risks are already part of the public debate because of current work on recombinant DNA. The danger is of producing harmful organisms that would escape from our control. The work obviously should take place, if at all, only with adequate safe-guards against such a disaster. The problem is deciding what we should count as adequate safeguards. I have nothing to contribute to this problem here. If it can be dealt with satisfactorily, we will perhaps move on to genetic engineering of people. And this introduces another dimension of risk. We may produce unintended results, either because our techniques turn out to be less finely tuned than we thought, or because different characteristics are found to be genetically linked in unexpected ways.

If we produce a group of people who turn out worse than expected, we will have to live with them. Perhaps we would aim for producing people who were especially imaginative and creative, and only too late find we had produced people who were also very violent and aggressive. This kind of mistake might not only be disastrous, but also very hard to 'correct' in subsequent generations. For when we suggested sterilization to the people we had produced, or else corrective genetic engineering for *their* offspring, we might find them hard to persuade. They might like the way they were, and reject, in characteristically violent fashion, our explanation that they were a mistake.

The possibility of an irreversible disaster is a strong deterrent. It is enough to make some people think we should rule out genetic engineering altogether, and to make others think that, while negative engineering is perhaps acceptable, we should rule out positive engineering. The thought behind this second position is that the benefits from negative engineering are clearer, and that, because its aims are more modest, disastrous mistakes are less likely.

The risk of disasters provides at least a reason for saying that, if we do adopt a policy of human genetic engineering, we ought to do so with extreme caution. We should alter genes only where we have strong reasons for thinking the risk of disaster is very small, and where the benefit is great enough to justify the risk. (The problems of deciding when this is so are familiar from the nuclear power debate.) This 'principle of caution' is less strong than one ruling out all positive engineering, and allows room for the possibility that the dangers may turn out to be very remote, or that greater risks of a different kind are involved in not using positive engineering. These possibilities correspond to one view of the facts in the nuclear power debate. Unless with genetic engineering we think we can already rule out such possibilities, the argument from risk provides more justification for the principle of caution than for the stronger ban on all positive engineering.

## Chapter 3: Decisions

Some of the strongest objections to positive engineering are not about specialized applications or about risks. They are about the decisions involved. The central line of thought is that we should not start playing God by redesigning the human race. The suggestion is that there is no group (such as scientists, doctors, public officials, or politicians) who can be entrusted with decisions about what sort of people there should be. And it is also doubted whether we could have any adequate grounds for basing such decisions on one set of values rather than another. ...

### 1. Not Playing God

Suppose we could use genetic engineering to raise the average IQ by fifteen points. (I mention, only to ignore, the boring objection that the average IQ is always by definition 100.) Should we do this? Objectors to positive engineering say we should not. This is not because the present average is preferable to a higher one. We do not think that, if it were naturally fifteen points higher, we ought to bring it down to the present level. The objection is to our playing God by deciding what the level should be.

On one view of the world, the objection is relatively straightforward. On this view, there really is a God, who has a plan for the world which will be disrupted if we stray outside the boundaries assigned to us. (It is *relatively* straightforward: there would still be the problem of knowing where the boundaries came. If genetic engineering disrupts the programme, how do we know that medicine and education do not?)

The objection to playing God has a much wider appeal than to those who literally believe in a divine plan. But, outside such a context, it is unclear what the objection comes to. If we have a Darwinian view, according to which features of our nature have been selected for their contribution to gene survival, it is not blasphemous, or obviously disastrous, to start to control the process in the light of our own values. We may value other qualities in people, in preference to those which have been most conducive to gene survival.

The prohibition on playing God is obscure. If it tells us not to interfere with natural selection at all, this rules out medicine, and most other environmental and social changes. If it only forbids interference with natural selection by the direct alteration of genes, this rules out negative as well as positive genetic engineering. If these interpretations are too restrictive, the ban on positive engineering seems to need some explanation. If we can make positive changes at the environmental level, and negative changes at the genetic level, why should we not make positive changes at the genetic level? What makes this policy, but not the others, objectionably God-like?

Perhaps the most plausible reply to these questions rests on a general objection to any group of people trying to plan too closely what human life

should be like. Even if it is hard to distinguish in principle between the use of genetic and environmental means, genetic changes are likely to differ in degree from most environmental ones. Genetic alterations may be more drastic or less reversible, and so they can be seen as the extreme case of an objectionably God-like policy by which some people set out to plan the lives of others.

This objection can be reinforced by imagining the possible results of a programme of positive engineering, where the decisions about the desired improvements were taken by scientists. Judging by the literature written by scientists on this topic, great prominence would be given to intelligence. But can we be sure that enough weight would be given to other desirable qualities? And do things seem better if for scientists we substitute doctors, politicians or civil servants? Or some committee containing businessmen, trade unionists, academics, lawyers and a clergyman?

What seems worrying here is the circumscribing of potential human development. The present genetic lottery throws up a vast range of characteristics, good and bad, in all sorts of combinations. The group of people controlling a positive engineering policy would inevitably have limited horizons, and we are right to worry that the limitations of their outlook might become the boundaries of human variety. The drawbacks would be like those of town-planning or dog-breeding, but with more important consequences.

When the objection to playing God is separated from the idea that intervening in this aspect of the natural world is a kind of blasphemy, it is a protest against a particular group of people, necessarily fallible and limited, taking decisions so important to our future. This protest may be on grounds of the bad consequences, such as loss of variety of people, that would come from the imaginative limits of those taking the decisions. Or it may be an expression of opposition to such concentration of power, perhaps with the thought: 'What right have they to decide what kinds of people there should be?' Can these problems be side-stepped?

## **2. The Genetic Supermarket**

Robert Nozick is critical of the assumption that positive engineering has to involve any centralized decision about desirable qualities: 'Many biologists tend to think the problem is one of *design*, of specifying the best types of persons so that biologists can proceed to produce them. Thus they worry over what sort(s) of person there is to be and who will control this process. They do not tend to think, perhaps because it diminishes the importance of their role, of a system in which they run a "genetic supermarket", meeting the individual specifications (within certain moral limits) of prospective parents. Nor do they think of seeing what limited number of types of persons people's choices would converge upon, if indeed there would be any such convergence. This supermarket system has the great virtue that it involves no centralized decision fixing the future human type(s).'

This idea of letting parents choose their children's characteristics is in many ways an improvement on decisions being taken by some centralized body. It seems less likely to reduce human variety, and could even increase it, if genetic engineering makes new combinations of characteristics available. (But we should be cautious here. Parental choice is not a guarantee of genetic variety, as the influence of fashion or of shared values might make for a small number of types on which choices would converge.)

To those sympathetic to one kind of liberalism, Nozick's proposal will seem more attractive than centralized decisions. On this approach to politics, it is wrong for the authorities to institutionalize any religious or other outlook as the official one of the society. To a liberal of this kind, a good society is one which tolerates and encourages a wide diversity of ideals of the good life. Anyone with these sympathies will be suspicious of centralized decisions about what sort of people should form the next generation. But some parental decisions would be disturbing. If parents chose characteristics likely to make their children unhappy, or likely to reduce their abilities, we might feel that the children should be protected against this. (Imagine parents belonging to some extreme religious sect, who wanted their children to have a religious symbol as a physical mark on their face, and who wanted them to be unable to read, as a protection against their faith being corrupted.) Those of us who support restrictions protecting children from parental harm after birth (laws against cruelty, and compulsion on parents to allow their children to be educated and to have necessary medical treatment) are likely to support protecting children from being harmed by their parents' genetic choices.

No doubt the boundaries here will be difficult to draw. We already find it difficult to strike a satisfactory balance between protection of children and parental freedom to choose the kind of upbringing their children should have. But it is hard to accept that society should set no limits to the genetic choices parents can make for their children. Nozick recognizes this when he says the genetic supermarket should meet the specifications of parents 'within certain moral limits'. So, if the supermarket came into existence, some centralized policy, even if only the restrictive one of ruling out certain choices harmful to the children, should exist. It would be a political decision where the limits should be set.

There may also be a case for other centralized restrictions on parental choice, as well as those aimed at preventing harm to the individual people being designed. The genetic supermarket might have more oblique bad effects. An imbalance in the ratio between the sexes could result. Or parents might think their children would be more successful if they were more thrusting, competitive and selfish. If enough parents acted on this thought, other parents with different values might feel forced into making similar choices to prevent their own children being too greatly disadvantaged. Unregulated individual decisions could lead to shifts of this kind, with outcomes unwanted by most of those who contribute to them. If a majority favour a roughly equal

ratio between the sexes, or a population of relatively uncompetitive people, they may feel justified in supporting restrictions on what parents can choose. (This is an application to the case of genetic engineering of a point familiar in other contexts, that unrestricted individual choices can add up to a total outcome which most people think worse than what would result from some regulation.)

Nozick recognizes that there may be cases of this sort. He considers the case of avoiding a sexual imbalance and says that 'a government could require that genetic manipulation be carried on so as to fit a certain ratio'. He clearly prefers to avoid governmental intervention of this kind, and, while admitting that the desired result would be harder to obtain in a purely libertarian system, suggests possible strategies for doing so. He says: 'Either parents would subscribe to an information service monitoring the recent births and so know which sex was in shorter supply (and hence would be more in demand in later life), thus adjusting their activities, or interested individuals would contribute to a charity that offers bonuses to maintain the ratios, or the ratio would leave 1:1, with new family and social patterns developing. The proposals for avoiding the sexual imbalance without central regulation are not reassuring. Information about likely prospects for marriage or sexual partnership might not be decisive for parents' choices. And, since those most likely to be 'interested individuals' would be in the age group being genetically engineered, it is not clear that the charity would be given donations adequate for its job.

If the libertarian methods failed, we would have the choice between allowing a sexual imbalance or imposing some system of social regulation. ...

### **3. A Mixed System**

My own sympathies are with the view that, if positive genetic engineering is introduced, this mixed system is in general likely to be the best one for taking decisions. I do not want to argue for an absolutely inviolable commitment to this, as it could be that some centralized decision for genetic change was the only way of securing a huge benefit or avoiding a great catastrophe. But, subject to this reservation, the dangers of concentrating the decision-making create a strong presumption in favour of a mixed system rather than one in which initiatives come from the centre. And, if a mixed system was introduced, there would have to be a great deal of political argument over what kinds of restrictions on the supermarket should be imposed. Twenty-first-century elections may be about issues rather deeper than economics. ...

### **4. Values**

The dangers of such decisions, even spread through all prospective parents, seem to me very real. We are swayed by fashion. We do not know the limitations of our own outlook. There are human qualities whose value we may not appreciate. A generation of parents might opt heavily for their

children having physical or intellectual abilities and skills. We might leave out a sense of humour. Or we might not notice how important to us is some other quality, such as emotional warmth. So we might not be disturbed in advance by the possible impact of the genetic changes on such a quality. And, without really wanting to do so, we might stumble into producing people with a deep coldness. This possibility seems one of the worst imaginable. It is just one of the many horrors that could be blundered into by our lack of foresight in operating the mixed system. Because such disasters are a real danger, there is a case against positive genetic engineering, even when the changes do not result from centralized decisions. But this case, resting as it does on the risk of disaster, supports a principle of caution rather than a total ban. We have to ask the question whether there are benefits sufficiently great and sufficiently probable to outweigh the risks. ...

The positive-negative boundary may seem a way of avoiding objectionably God-like decisions, on the basis of our own values, as to what sort of people there should be. Saving someone from spina bifida is a lot less controversial than deciding he shall be a good athlete. But the distinction, clear in some cases, is less sharp in others. With emotional states or intellectual functioning, there is an element of convention in where the boundaries of normality are drawn. And, apart from this, there is the problem of explaining why the positive-negative boundary is so much more important with genetic intervention than with environmental methods. We act environmentally to influence people in ways that go far beyond the elimination of medical defects. Homes and schools would be impoverished by attempting to restrict their influence on children to the mere prevention of physical and mental disorder. And if we are right here to cross the positive-negative boundary, encouraging children to ask questions, or to be generous or imaginative, why should crossing the same boundary for the same reason be ruled out absolutely when the means are genetic? ...