Human beings have always sought means of enhancing human capacities, and we now appear on the verge of greatly expanded abilities to do so. The Hastings Center project on technologies aimed at the enhancement of human capacities originally aimed to develop policy guidelines for such enhancements, and more specifically to elucidate the various factors that are relevant for determining appropriate policy responses for different enhancement technologies. The project focused on three case studies—cosmetic surgery, psychopharmacological engineering, and genetic engineering—but I shall not restrict my discussion to them because only by looking at a wide array of enhancements will we understand their full ethical and public policy complexities. One might hope that a relatively simple classification of enhancement technologies might be possible for the purposes of developing public policy guidelines for them. The main argument of this paper, however, is that no such simple classification or guidelines are possible because of several kinds of complexities which I will briefly explore, or at least illustrate, here.

First, there are too many different kinds of enhancements, which extend substantially beyond the three paradigm cases mentioned above; for example, many common activities of parents or social institutions are designed to enhance the capacities of individual humans, although we may not think of them as technologies, such as music lessons or sports camps for children. Second, too many different policy responses are possible to different enhancement technologies; for example, beyond simply prohibiting or permitting are a variety of ways of more or less strongly discouraging or encouraging the development and use of such technologies. Third, there are simply far too many morally important features of enhancement technologies, as well as moral considerations and arguments that bear on the appropriate policy responses to them.

The overall upshot of these complexities is that it is unrealistic to expect to develop any simple classification of different enhancement
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technologies, or guidelines for the development of appropriate public policy for them. My aim in this paper will be to try to bring out some of this complexity in the hope of making our thinking about public policy for human enhancement technologies more consistent, nuanced, and systematic. At this relatively early stage in thinking about public policy for new technologies like psychopharmacology and genetic engineering, the greatest danger may be to attempt to respond too quickly, unsystematically, and in ad hoc ways to different technologies as they gain public attention and concern, and thereby to miss some of the important considerations that make these policy issues so complex.

Moral Categories of Enhancements

Before turning to the complexities of different kinds of enhancement technologies and policy responses to them, it is worth noting that within ethics itself, there are different moral categories into which different enhancement technologies can be placed. Use of some enhancements is widely believed to be morally required for the benefit of the individuals whose capacities are enhanced. Vaccines that are used to enhance individuals' responses to specific health threats, and which are typically required for children before they enter school are one example. Another example of a morally required enhancement activity, if not technology, is education itself; parents are legally required to send their children to school, or to develop alternative plans for their education at home, at least until the children reach age 16. This action is believed to be morally required in order to give children, and the adults they will become, the minimum skills necessary for a reasonable array of opportunities in life.

Use of another large category of enhancements is generally considered to be morally permissible, that is, neither morally required nor morally prohibited. Examples include parents providing music lessons for their children and individuals having cosmetic surgery; in both cases, most people believe that it should be up to the individual parents, or to the individuals considering cosmetic surgery, to decide whether to employ these enhancements.

Another moral category of enhancements includes those generally considered morally prohibited. Some people believe this category includes only enhancements used by one party for another party, while others believe that it also includes enhancements used by an individual for him or herself. For example, some people support prohibiting any
use of enhancement technologies with a sufficiently poor risk/benefit ratio; other enhancements used by parents for their children should be morally prohibited if they come at the cost of violating the child's right to an open future, a case to which I shall return later.

The moral categories into which different enhancements can be placed are, of course, more complex than this simple three-part classification; for example, what may be most important about some enhancements is their relationship to the development of specific moral virtues, such as compassion or benevolence, or their impact on important social values such as community.

**Different Kinds of Policy Responses to Enhancement Technologies**

Just as there are a variety of moral categories that can be applied to different enhancement technologies, there is also a broad range of possible public policy responses to various enhancement technologies. In illustrating some of these different responses, I shall assume that it is the state, that is, the government in some form and at some level, that is setting policy. However, public policy is not made only by direct state action. At least quasi-public policy is also made by a variety of nongovernmental institutions. For example, a variety of professional bodies in medicine have substantial influence over medical practice through promulgation of a variety of regulations and guidelines. To the extent that government permits, authorizes, or even enforces these regulations, they constitute at least de facto public policy, even if the government does not itself promulgate the regulations and guidelines. But even if we focus only on direct governmental action, there is a wide range of policy responses that represent sometimes subtly different attitudes, evaluations, and regulations of different enhancement technologies.

There is a continuum of positive and negative governmental responses to different enhancement technologies. At the mid-point of this continuum is complete neutrality—a "hands off" policy in which government takes no action that significantly affects the development or use of the technology. The continuum extends in both positive and negative directions from this mid-point, and I will first explore the positive end. Government can encourage the use of enhancement technologies in a variety of ways without directly supporting them or requiring their use; for example, government can support or carry
out educational programs to encourage parents to get their children vaccinated to enhance the capacity of their children's immune systems to ward off disease. These attempts at persuasion leave others free to accept or reject the intended influence of the persuasive programs. Government can provide additional support for enhancement technologies like vaccines by providing financial incentives or support for the development of such vaccines, for example, through research support from the National Institutes of Health. Incentives can also be provided to individuals to make use of these enhancement technologies once they are developed, such as subsidies to parents of the costs of vaccinating their children.

Moving from persuasive to coercive interventions, government can require the use of particular enhancement technologies as a condition for individuals or organizations to engage in otherwise optional activities; for example, vaccinations can be required for foreign travel by U.S. citizens in areas where particular health threats are especially severe. These requirements can also be imposed for required, not just optional, activities; for example, most states require that parents have their children vaccinated for a variety of diseases before the children enter school. These requirements are in part for the benefit of the children who are vaccinated, as well as for "herd immunity" to protect unvaccinated children and persons with whom unvaccinated and infectious children might come into contact. Further out still on the positive end of this continuum are specific legal requirements for the use of certain enhancement technologies, with civil or possibly even criminal penalties for not doing so; there are not many instances of this kind, but examples include basic education for children and perhaps enhancement technologies aimed at reducing certain public health threats.

This same continuum covers a variety of possible negative governmental responses to enhancement technologies. An appropriate responsibility of government can be to ensure that those who make use of enhancement technologies are well informed about the potential benefits and risks of doing so. Educational programs to increase the public's understanding of the risks and benefits of the technologies need not be intended or seen as a negative policy response to the enhancement technologies in question. However, similar efforts to emphasize the risks of particular enhancement technologies may become persuasive efforts to discourage their use. Government can also provide financial or other disincentives for the use of particular enhancement technologies, for example, by taxing or regulating them heavily. Stronger negative
responses include prohibitions of the use of particular enhancement technologies by persons engaged in either optional or required activities; for example, government or professional associations can ban the use of certain enhancement technologies, such as steroids for building muscle mass and strength, by individuals who participate in amateur or professional athletic activities. Finally, civil or criminal penalties can be attached to providing or using specific enhancement technologies; for example, health care professionals could face penalties for making steroids available to athletes, or for making psychopharmacological enhancement technologies with particularly unfavorable risk-benefit ratios available to children or adults.

Many governmental actions concerning enhancement technologies could be designed, not to promote or discourage their use, but to ensure that they meet standards of safety and efficacy. This possibility extends to enhancements regulations comparable to those of the Food and Drug Administration and other government bodies of medical interventions, drugs, and devices. Government regulation is used in a variety of contexts in which there is reason to believe that market forces will be inadequate to protect the public from serious risks of harm. The moral importance of individual self-determination and freedom in pursuit of one's own conception of a good life, however, supports a presumption for government neutrality toward enhancement technologies; perhaps combined with regulations for safety and efficacy. However, this presumption can be overcome by a variety of considerations that I shall pursue below.

**Who Is Using Enhancement Technologies**

It is often morally important to know who is using particular enhancement technologies. I believe the most important differences are between three cases: first, when government employs the technologies, or strongly encourages or requires their use; second, when individuals decide to use the technologies for others, in particular when parents use them for their children; and, third, when individuals themselves use technologies to enhance their own capacities. One obvious important moral difference between these cases is that only the first two raise the important issue of the authority, moral or legal, of one individual, group, or institution acting in a way that can profoundly affect the life and capacities of another. A second difference, less obvious but no less important, is that different degrees and forms of neutrality are properly
expected from the state, from parents acting to affect their children, and from individuals acting to affect themselves.

Let me begin with the issue of neutrality between different conceptions of a good life. An important feature of liberal political theory is that the state should seek to be neutral between different “thick” or comprehensive conceptions of a good life that its citizens may hold. Liberals seek to avoid or limit the state’s strongly favoring particular conceptions of a good life that not all of its citizens share. Instead, the state’s role is to set the terms, or provide the institutional setting, in which all individuals can freely pursue their own different and sometimes conflicting conceptions of a good life. This liberal neutrality places substantial limits on governmental action to employ, encourage, or require the use of specific enhancement technologies that are only beneficial in some specific conceptions of a good life. The enhancements compatible with this liberal state neutrality are roughly those that fit what John Rawls called “primary goods,” that is, general purpose means useful in at least a wide array of, if not virtually all, plans of life. When particular enhancements have this general purpose usefulness, the state’s claim that they benefit the individuals affected requires no appeal to a particular conception of a good life that those individuals may not share.

What are examples of enhancements with this general purpose usefulness? Most communities in the United States now place fluoride in the water supply to enhance individuals’ normal resistance to tooth decay. Tooth decay is unwanted and harmful from virtually any perspective or conception of a good life, and so the state may legitimately take steps to enhance individuals’ capacities to avoid it without violating any commitment to liberal neutrality. Government also requires for roughly the same reasons that parents send their children to school up to age 16. Education can be, I believe, properly understood as an enhancement technology, taking “technology” in a broad sense, because it is aimed at enhancing a wide array of cognitive and other capacities. Basic education does not fit a person for only a few life plans or conceptions of a good life, but is necessary, or at least useful, in a very broad array of life plans within modern societies. Consequently, requiring basic education for all children does not violate liberal state neutrality. Of course, disagreement about whether the state can legitimately employ enhancement technologies with more limited usefulness may reflect deeper disagreements within political philosophy about the extent to which the state either can or should attempt to remain neutral between
different conceptions of a good life. This disagreement is a fundamental issue dividing liberal and communitarian political philosophers.

I turn now to the case of individuals using technologies to enhance the capacities of other persons; parents’ use of such technologies to enhance their children’s capacities is the paradigm example. Whoever has primary responsibility for raising children—in most societies, their parents—must have significant discretion in the values they impart, as well as in the particular capacities that they seek to develop and enhance in their children. The degree of neutrality between different conceptions of a good life that liberal political theory asks of the state is neither possible nor desirable from parents raising their own children. Parents should have significant discretion in the use of enhancement technologies for their children, based both on the values they want to transmit to their children and on their assessment of their children’s capabilities and interests; for example, whether to provide music lessons or sports camps or computer courses. The alternatives available to parents may come to include psychopharmacologic or genetic engineering, although these prospects are mostly still in the future and not well defined.

There are moral limits, however, on the authority of parents to enhance their children’s capacities, as the following case illustrates. Suppose parents put their nine-year-old child into an intensive tennis training program aimed at developing the child’s capacities to become a professional tennis player. This enhancement program aims at a very specific plan of life for the child and also attempts to bring the child to share the goals and plans the parents have for it. It is generally accepted that parents have a right to put their children into such programs even if others may doubt the wisdom of their doing so. But suppose the parents also said that the child’s education was interfering with attempts to develop her capacity as a tennis player, and so proposed to remove her from school. Public policy, quite properly, would not permit them to do so.

This child’s parents have selected a very specific plan of life for her, and now propose to enhance her capacity for that life at the cost of severely limiting or neglecting many other capacities and opportunities she would otherwise have to choose among many other different plans of life. One way of characterizing why the parents’ plan for their child is wrong is that it would violate what Joel Feinberg has called a child’s right to an open future. Parents do not have an unlimited moral right to shape their children, and their children’s capacities, at the cost of denying them a reasonable array of opportunities to select and pursue
their own conception of a good life as they mature and develop the capacities to make those choices. A child needs at least a basic education to ensure those opportunities. Children’s right to an open future is derivative from the more fundamental moral right of adults to self-determination in making significant decisions about their own lives for themselves and according to their own values or conception of a good life. Disagreements will arise, of course, about the extent or scope of a child’s right to an open future, and about what actions would violate that right, but the right places significant limits on the use of enhancement technologies by parents for their children. In other cases, this same right can support parents’ use of enhancement technologies that have the effect of enlarging and strengthening their children’s capacities and opportunities to choose and effectively pursue a wide range of life choices. Basic education has this effect, and in the future some psychopharmacologic or genetic engineering technique, for example, increased general memory capacities, could have the same effect.

When individuals use enhancement technologies for themselves, that is, to enhance their own capacities, no neutrality between different conceptions of a good life is called for, neither the strong neutrality required of the liberal state, nor the much more limited neutrality required of parents with their children. An individual’s choices—of a specific plan of life, and to enhance the capacities necessary for that plan of life—are exercises of self-determination, not impingements on another’s self-determination. Public policy may legitimately seek to ensure that such choices are well informed, particularly when they carry significant and irreversible risks; but as long as individuals have normal decision-making capacities, they have a right to make such choices, even when they do so foolishly and with consequences that they may later come to regret. It may be wise for individuals to develop and enhance their capacities in ways that don’t unduly close off future opportunities, including opportunities to revise and change their plan of life, but it is neither the responsibility nor the right of others, either the state or other individuals, to ensure they do so.

I have explored the issue of the appropriate neutrality regarding different conceptions of a good life expected of the state, of parents toward their children, and of individuals when their actions principally affect themselves, to illustrate why who is employing a particular enhancement technology is important to the legitimacy of their doing so. There are other reasons why who is using an human enhancement technology is important. It is widely accepted that individuals are entitled
to take risks for themselves that they would not be justified in imposing on or choosing for others. For example, individuals can volunteer to undergo high-risk medical procedures in therapeutic or research contexts, for which they would not be permitted to volunteer another for whom they are responsible. When enhancement technologies like psychopharmacologic or genetic engineering carry significant risks, for example, from uncertainty about their more subtle or long-term effects, they may be acceptable for individuals to use themselves, but not to use for others such as their children. While there is not space here to pursue this issue further, I believe there are additional respects, besides the appropriate neutrality regarding conceptions of a good life and the appropriate levels of risk that can be assumed, which make who would use an enhancement technology important for the overall assessment of whether that use is morally justified.

**Enhancements and the Concept of Benefit**

One source of concern about whether public policy should promote enhancements may be linked to whether particular enhancements would in fact produce a benefit. There are several reasons why the benefits of enhancements may seem more problematic than those of treatments. First, some putative enhancements might be beneficial not for the individual who undergoes the change, but only for others. For example, in Aldous Huxley’s *Brave New World* the class of persons called “Deltas” were engineered to be satisfied with boring and relatively menial work. This engineering was thought to benefit the larger society by providing persons willing and only able to take and fill these social roles. It was not a genuine enhancement, however, since there was no pretense that it was good for the Deltas to be created with these limited capacities. Second, some paternalistic enhancements allow others to believe that a person has benefited by undergoing a change, though the individual him or herself does not believe the change to be beneficial. In Peter Kramer’s book, *Listening to Prozac*, he describes a patient on Prozac who lost his bristly and curmudgeonly qualities and became less dissatisfied and critical. Although others may have preferred his new persona, he felt he had lost a central part of the character that had defined him.

Setting aside these two kinds of cases as not genuine enhancements, can we say that what is a disease, and so what counts as a treatment of disease, is objective in a way that what counts as an enhancement is not? For example, loss of sight or mobility seems to be objectively
and uncontroversially bad for a person, and any treatment of a disease which prevents such losses would likewise be objectively and uncontroversially a benefit. Contrast them with enhancing the capacity to play a musical instrument or to excel in athletics. Some people have no desire to play music or athletics, and would see neither enhancement as a benefit. Similarly, from some radical positions in the disability rights movement, even the loss of hearing is not a harm. We can, however, set aside that kind of radical challenge; a sense capacity like hearing is plausibly considered a general purpose means, useful and important in nearly any life plan, although that is not to say that individuals cannot accommodate their life plans to its loss. Musical skill or excellence in athletics, by contrast, are only benefits within some, but not all, life plans.

This assertion is not, however, a general contrast between harms prevented by the treatment of disease and benefits from enhancements. First, some impairments from disease are only harms within particular life plans; for example, certain fine motor skills are needed by a pianist but are not called on in most other life plans. Second, there are potential enhancements of general purpose means, such as memory or the capacity to focus one’s attention, that would be beneficial within virtually any life plan. Thus, there is no systematic difference between the benefits from enhancements and the harms prevented by the treatment of disease that makes the latter objective in a way the former are not. There are enhancements that would be a benefit within nearly any life plan, others that would be a benefit in most but not all life plans, and still others that would be a benefit only within very specific and unusual life plans. Public policy should reflect these differences and take as one goal to ensure that enhancements are used only by and for persons for whom they would in fact be a genuine benefit. Whether any particular change in an individual’s conditions or capacities is a beneficial enhancement must be assessed against that individual’s particular aims, plans, and values.

Are the Means Used to Enhance Capacities Morally Important?

Besides the different ends at which enhancements aim, they also differ in the means used to achieve those ends. If we consider only the three paradigm cases of cosmetic surgery, psychopharmacology, and genetic engineering, one important difference in means emerges. Nei-
ther surgery to change physical appearance, nor a pill to change psychological traits, nor genetic intervention to change or shape an individual’s genome, involves substantial discipline and effort to produce the desired feature or capability. For example, altering a fundamental character trait or psychological feature by a “quick fix” of “popping a pill” seems to some people too easy and less admirable than changing that same trait or feature through hard-earned insight psychotherapy. One method engages our uniquely human, rational capacities, while the other bypasses them and works directly on our brain chemistry. The moral or policy significance of distinctions like this one is problematic and I shall not pursue it further, but only make a general point about the importance of means.

Sometimes a valued human activity is defined in part by the means it employs, not just by the end at which it aims. Consider two examples. In some sports, building body strength and mass through physical training is an appropriate means of enhancing those features, whereas doing so by the use of steroids is not. Our understanding of the nature of the sport includes not just the final performance itself, but also the means by which the capacities for that performance are gained. Given that understanding, the use of steroids bypasses a relevant part of the sport—physical training—and amounts to a kind of cheating on the means that are appropriate to achieving success in the sport. The second example comes from chess. It was a great achievement when IBM’s computer “Big Blue” recently beat the world chess champion, Gary Kasparov. But it surely was a very different achievement than if a human challenger had beaten Kasparov. And suppose the IBM engineer who implemented the moves that Big Blue chose claimed that he had beaten Kasparov, albeit by unorthodox means? Here, means make all the difference in the chess skills and successes with which the engineer should be credited.

In many valued human activities, the means of acquiring the capacities required for the activity are as much valued and admired as the performance of the activity. They are a part of the very definition of the activity, and transforming them transforms, and can devalue, the activity itself.

**The Importance of the Magnitude of Enhancements**

Most enhancements of human capacities or traits can be distinguished by the magnitude of changes produced. If the capacity or trait is in general beneficial to a person, then it might be thought that the more it is enhanced, the greater the benefit. But that would be wrong for
at least two kinds of reasons. First, some enhancements are only beneficial within a limited range because of how the enhanced capacity or trait interacts with the individual’s other capacities or traits. Beyond that range, further enhancement of a particular property may interact in sufficiently undesirable ways with the individual’s other properties to make the change, all things considered, a harm instead of a benefit. It is recognized, for example, that humans have different forms of memory. We can imagine enhancements of a particular form of memory that so crowds out other forms of memory and/or other cognitive processes as to be overall a harm instead of a benefit; enhancements of that form of memory within a limited range, however, are a benefit.

The second reason why some enhancements would only be beneficial within a limited range is that beyond that range individuals would become unsuited for human social life. There are social and economic advantages to being tall; that is why growth hormone that can raise a normal individual’s height to several inches above the norm would be a beneficial enhancement. But there are limits to how much of an increase in height would be beneficial. To be nine feet tall would on balance be harmful in nearly any human society because our social world is constructed for persons whose height rarely reaches beyond seven feet. One would literally become, in a physical respect, unfit for human company. And if the change were still more dramatic, as in the case of Gulliver in Lilliput, then it could become hard even to see the individual as a member of the same species. Many changes in human features and capacities would only be beneficial enhancements within some range, and public policy could quite appropriately regulate or otherwise limit the use of enhancement technologies to ensure that the gain stays within the beneficial range.

A Miscellany of Other Moral Problems with Enhancements

I now want to state very briefly several miscellaneous moral problems concerning enhancements of human capacities that have significant bearing on public policy. The first problem arises when an enhancement confers a competitive or positional advantage on its recipient, thereby strengthening his or her position relative to others in competitions for scarce roles or benefits. If the enhancement is not generally available to all who might want it and benefit from it, but is expensive and distributed on the basis of ability to pay, then only the economically well-off will get it. This problem raises concerns about fairness and
equality of opportunity. Specifically, individuals whose competitive position for a particular role or benefit is worsened as a result of their inability to afford the enhancement can complain that they no longer have a fair opportunity to compete for the benefit against those who have purchased the competitive enhancement. Each of the three paradigm cases of enhancements provide examples of this problem. Since being physically attractive is an advantage in work and other contexts, expensive cosmetic surgery can confer this advantage. If expensive medications like Prozac can improve an individual’s self-confidence, that too can be a significant advantage in work and other contexts. And if genetic interventions someday become possible to enhance a capacity like memory, or specific forms of memory, that too would provide a competitive advantage in work and other contexts. Of course, we already tolerate the distribution of many competitive advantages, including enhancements such as higher quality private school education, largely on the basis of ability to pay, and we might tolerate distributing these new enhancements on that basis as well. But tolerating unfairness hardly makes it less unfair. If significant competitive benefits accrue from new abilities to enhance human capacities available only on an ability to pay basis, their use will raise serious issues of fairness for public policy.

The second moral problem arises when an enhancement is likely to be used by nearly everyone because it is thought to confer a significant competitive or positional advantage and is widely available—perhaps because it is funded through health insurance or other social welfare programs or because it is so inexpensive that nearly everyone can afford it. An example, although it is certainly not a low-cost intervention, is the use of growth hormone to secure the advantage that comes with increased height. If all parents used growth hormone to increase their children’s height, no children would gain any relative advantage because all children’s height would be increased and no one’s height relative to others would change. The attempt to gain a competitive advantage from an enhancement available to everyone will be self-defeating. The case of growth hormone illustrates not only the lack of any benefit from universally available competitive enhancements, but also the waste of resources and the assumption of needless risks from use of the enhancement.

Public policy can reasonably limit the use of enhancements that would be unfair or self-defeating. But there is a complication. Many enhancements likely to become possible will in part confer competitive or positional advantages, and in part constitute intrinsic goods that
confer noncompetitive benefits. Suppose, for example, that it becomes possible in the future through either psychopharmacology or genetic interventions to improve individuals’ capacity to focus their attention for significant time on a particular task or activity. Many adults with no disease or deficit now use the drug Ritalin for this purpose. Its use clearly confers an important competitive advantage to individuals in work contexts. But it also increases the intrinsic satisfactions those individuals obtain from activities like listening to music, watching films or sunsets, and so forth, none of which are competitive benefits. The quandary for public policy is that concerns about fairness or avoiding self-defeating interventions supports limits on the use of such enhancements, but these limits at the same time deny individuals the opportunity of gaining significant noncompetitive, intrinsic benefits.

The third moral problem for public policy concerns enhancement technologies that, at least in some contexts, hold out the possibility of significant benefits, but also appear to have problematic or clearly unfavorable risk/benefit ratios. Two relatively polar policy options exist for dealing with serious risks, which we have seen mirrored in other public policy contexts, such as regulating risks in the workplace and regulating drugs and devices. The aim of public policy can be to ensure that individuals have full information regarding the risks and benefits of an enhancement, leaving them free to determine for themselves whether the risk/benefit ratio is acceptable; this approach is the one taken, through requirements of informed consent, with most high-risk medical treatments for serious medical conditions. The alternative is a strong regulatory oversight process in which enhancements must satisfy a clearly favorable risk/benefit ratio, or be without significant risks, to be permitted. This approach more closely approximates the alternative we have taken with drugs and devices, or with hazardous conditions like carcinogens in the workplace. There are, of course, many alternative policy positions which strike different balances between leaving informed individuals free to make their own choices, on the one hand, and paternalistic regulatory protection of individuals against serious risks, on the other.

Especially for genetic and psychopharmacological enhancements, there will often be substantial uncertainty about both their benefits and risks. Some enhancements may have relatively broad effects on complex, multifactorial traits, sometimes stretching out over considerable time and resulting in considerable controversy and uncertainty about a particular enhancement’s overall degree of risk and potential for benefit. If
public policy seeks to regulate acceptable risks, controversy is inevitable about when the risks of a potential enhancement are too high to justify permitting it. Sufficient latitude will be needed in such enhancements to accommodate reasonable disagreements between persons about when the risk/benefit ratios are acceptable. Germline genetic enhancements, for example, carry much greater uncertainty and risks, since they have the potential to affect large numbers of persons as they are passed on across generations.

The fourth problem concerns a potential bad effect of enhancements whose precise nature and likely extent are both speculative at present. When one person employs extensive enhancements to shape the nature and capacities of another person, most typically in parent-child contexts, the parent may view the child as an object to be molded to fit the parents' aims and values, not a unique individual whose character, capacities, and life history should be permitted to unfold according to its own nature. This attitude reflects an objectification of the child by its parents and a failure to respect it as an autonomous individual, an attitude that should be discouraged, not encouraged. The second part of this concern is the potential effect on the individual who is the subject of the objectification. If one has been extensively shaped by another person, one might lose one's sense of self-creation and individuality, both of which depend on the belief that one has significant capacity to control and determine over time the kind of person one becomes by the choices and commitments one makes. If many traits essential to individuals' sense of their own identity now have to be understood as having been specifically selected for them by others, then they become not the deliberate creations of their own doing and choices, but products of the doings and choices of others. The concern is that individuals may come to see themselves more like objects that have been manipulated by others than like agents who have created themselves. This concern was strongly expressed by many opponents of human cloning in the wake of the cloning of a sheep, and it applies in a more limited form to enhancements of human beings.

The fifth problem with enhancement technologies concerns those that create competitive or positional advantages for some individuals, but at the cost of significant adverse consequences for others. When some individuals use enhancement technologies to gain competitive advantages for themselves, they put coercive pressure on others to use them as well so as to avoid becoming worse off than they were initially. One of the most familiar examples is the use of steroids in high school
and college athletics. When some athletes use steroids to gain physical bulk and strength, others with whom they compete will be strongly pressured to use them as well, even if they would prefer not to assume the risks of doing so. Failing to use the steroids may effectively bar them from athletic participation or success. The task for public policy is to determine when the frequency and seriousness of coercive pressures to use risky or expensive enhancement technologies are sufficient to warrant prohibition or regulation of the use of the technologies; for example, public policy now generally restricts the use of steroids in high school athletics, but permits the use of expensive specialized courses for high school students to improve their scores on SAT tests.

Finally, would some individuals' use of enhancement technologies create additional harms to other persons, besides a worsened competitive position and coercive pressures to use the enhancement themselves? Any full answer to this question will require experience with the nature of the enhancements that become possible and the indirect effects they have on others, but there is one kind of potential harm that it is worth signaling at this time. Consider the prevention of disabilities that disability rights advocates have claimed is harmful to other persons with the disabilities. For example, testing is typically recommended for pregnant women over age thirty-five for the genetically transmitted disorder of Down's syndrome. Women who find that their fetus has this disorder typically abort the fetus and try again for a normal pregnancy. Disability rights advocates have argued that this practice harms persons who have Down's syndrome by sending a message that their lives are not worth living, and that it would have been better if they had never been born. They argue that these judgments are implicit in any woman's deliberate decision to abort a fetus with Down's syndrome to prevent it from coming into existence, and that they demean and devalue the lives of persons with Down's syndrome. Defenders of the testing respond that no message is sent that persons with Down's syndrome don't have lives worth living, nor that they should be killed, but only that if it is possible to create a person without this disability instead of a person with it, it is reasonable to prefer the former.

This issue is complex and unresolved, though my own view is that the charge of the disability rights proponent can be met. But the point here is that enhancements may raise issues similar to the disabilities case. Indeed, in one respect the implicit message of some enhancements may be worse because they may respond only to prejudicial stereotypes about some groups, not real differences in function produced by
disabilities like Down's syndrome. For example, suppose a person has a "hooked nose" of a sort stereotypically associated with Jewish persons, and seeks cosmetic surgery to rid herself of this feature of her appearance. As in the disabilities case, it could be argued that this "enhancement" sends a message to other Jews that it is better not to have this supposed mark of being Jewish, and that being Jewish is somehow to be inferior. Cosmetic surgery in a case like this reinforces stereotypes and prejudices about Jews, and is thereby harmful to other Jews. Similar cases may arise in the future with genetic engineering. Suppose it became possible to change a person's genes for skin color, and some African-American parents sought a genetic intervention to change the color of their future children's skin from black to white. Here again, their action would clearly send a message that they considered it to be a burden to have black skin, and would play into deeply harmful prejudices and stereotypes about African-Americans. African-Americans could argue that the values this "enhancement" expresses are harmful to them by reinforcing the prejudices and stereotypes of white society about them. These two cases illustrate that it is a mistake to think that the only harm some people's enhancements could cause to others is to put them at a competitive disadvantage. Serious harms can come to others from the value judgments that enhancements express that devalue and degrade them.

Who Should Pay for the Enhancement Technology?

The final public policy issue that I will take up here is whether human enhancement technologies, particularly those employed in medical contexts or using what we intuitively think of as medical means, should be covered and funded by health insurance, such as private health insurance or public health insurance programs like Medicare and Medicaid, or by other social welfare programs. Here is one argument that enhancements should not be covered by health insurance. The aim of medicine is commonly agreed to be the promotion and protection of health; health is the absence of disease, therefore, medicine's aim should be the treatment or prevention of disease. Enhancement of normal function is neither the prevention nor treatment of disease; therefore, enhancement of human function is not properly part of medicine. The proper role of health insurance is to protect and promote health by funding medical care. This argument vastly oversimplifies some very complex and controversial issues, but if something like it is correct, then only the treatment or prevention of disease, not the
enhancement of normal function, should be covered by health insurance. However, this apparently straightforward argument for excluding enhancement technologies from coverage by health insurance is problematic for several reasons.

First, some services that are properly and standardly covered by health insurance do not treat or prevent disease; for example, abortion services are typically covered by health insurance, but a normal pregnancy is not a disease and its termination by an abortion is not medical treatment, although it is typically done by medical personnel using medical means. There can be sound public policy reasons for funding certain services under health insurance, although those services do not treat or prevent disease.

Second, every service that does treat or prevent disease need not be covered by health insurance. Some treatments are excluded from coverage because they are experimental, although they are clearly intended as treatment. Moreover, some nonexperimental treatments may not be covered by health insurance because of reasonable resource limits under which health insurance plans operate. Fair procedures to allocate scarce resources can reasonably exclude some low-benefit/high-cost medical treatments. An account of the just allocation of resources to and within health care, not simply a determination of what is medical treatment for a disease, is necessary to determine which treatments should be covered under health insurance. Moreover, as we will see shortly, the reasons that a theory of justice requires the funding of most treatments in public or private health insurance programs might warrant the funding of some enhancements as well.

Finally, some enhancements are intended to prevent disease, and so should be covered and funded according to the standard rationale for health insurance as covering services for the treatment and prevention of disease. Perhaps the most straightforward example is vaccination programs. Vaccinations for specific diseases enhance the normal immune system’s ability to respond to and prevent those diseases. More general enhancements of the body’s capacity to respond to and prevent a broad array of diseases may become possible through genetic interventions. In either case, these medical enhancements are for the prevention of disease and therefore should be eligible for coverage by health insurance like other preventive interventions. Thus, there are several respects in which the treatment/enhancement distinction does not mark the line between services that should be covered and services that should be excluded from coverage in private or public health insurance plans.
The conclusion stated at the end of the preceding section can be reinforced by delving in more depth into the reason why it is widely agreed that access to medical treatment should be guaranteed to all citizens by public or private health insurance. In the most well-developed and widely accepted theory of justice in health care, Norman Daniels argues that the provision of health care is a matter of justice because of its role in maintaining or restoring normal function, which in turn helps maintain fair equality of opportunity for all citizens. Fair equality of opportunity is the fundamental moral principle underlying the typical restriction of health insurance coverage to the treatment or prevention of disease. Could enhancements of normal human function also promote fair equality of opportunity? They could if the same disadvantage can be present in an individual who is at the low end of normal function, but has no disease that requires treatment, as in a person whose disadvantage is caused by disease that can be treated. Our concern for equality would then extend beyond eliminating inequalities of opportunity caused by disease to inequalities whose removal would count as enhancement, not treatment.

The problem for grounding claims to treatment, but not enhancement, in equality of opportunity is understanding why the same disadvantage should have a claim on social resources for its removal when it is caused by disease, but not when it is within the range of normal human function and in the absence of disease. David Allen and Norman Fost’s case of two children who are both of predicted short stature illustrates the problem. The first child, Johnny, has a deficiency in the production of growth hormone as a result of a brain tumor that has been successfully treated; his predicted adult height is five feet three inches, significantly below the norm for adult males in his society. The second child, Billy, secretes normal levels of growth hormone, but has short parents; he too has an expected adult height of five feet three inches. Short stature is a social and economic disadvantage in our society; each boy suffers from this same undeserved disadvantage. Only Johnny, however, has a disease that impairs function, that is, his deficient production of growth hormone, whose treatment would result in an expected increase in his adult stature. But there is good reason to believe that giving growth hormone to Billy, whose production of it is already in the normal range, would produce the same increase in his expected adult height as for
Johnny. Thus, if we want to rectify undeserved disadvantages in order to secure fair equality of opportunity, why should only Johnny, but not Billy, receive growth hormone?

Concern for equality and rectifying undeserved disadvantages apparently supports giving growth hormone to Billy, who has genes that will produce short stature, as much as to Johnny, who has a disease that will result in short stature. There is much more to be said about how an account of just health care grounded in a principle of fair equality of opportunity should apply to cases like this. Despite difficult cases like that of growth hormone, pragmatic concerns together with moral and political concerns that cannot be explored further here, may support use of the treatment/enhancement distinction as a rough guide to the health care that all should have as a matter of justice. The case of growth hormone does show, however, that there is no straightforward and unproblematic limiting the fair equality of opportunity account of just health care to disease only, and not to enhancements that would rectify disadvantages in opportunity caused by normal genes.

Equality of What?

Even if fair equality of opportunity requires only access to treatment and not enhancement, a more general egalitarian concern reaches more broadly. Fair equality of opportunity would be secured, at least in health care, when no treatable disease causes an impairment of normal function and in turn of opportunity. However, remaining significant differences in people’s talents and abilities would result in inequalities in opportunities and welfare. Many of these inequalities would be caused by genetic differences between persons, all of which remain within the norm for the species. Amartya Sen has argued that the proper egalitarian concern is with individuals’ capabilities, or capability sets, not with fair equality of opportunity as it is typically understood by Rawls and others. Individuals with significantly different levels of natural talents and abilities do not have equal capabilities to achieve satisfying and worthwhile lives. A broad egalitarian focus on capabilities has the advantage that it seeks to eliminate these genetically inherited, undeserved and unchosen inequalities between persons that the fair equality of opportunity account would leave in place.

As our knowledge of psychopharmacology and human genetics continues its exponential growth in coming years, we can expect to learn both how genes are linked to particular inequalities in capabilities and
in turn how genetic or psychopharmacological interventions can reduce or eliminate many of these inequalities. For example, the range of normal memory in humans is relatively broad, and people's memory has a significant impact on their performance in a variety of social tasks and roles that in turn impact their expectations and opportunities. Interventions to enhance the memory of people at the low end of the normal range could reduce the disadvantages in capabilities they suffer.

As the important and lively "equality of what" debate over the last two decades displays, egalitarian concerns can have other alternative focuses besides fair equality of opportunity or capabilities, none of which can be pursued further here. The important point for present purposes, however, is that even if treatment but not enhancement supports the protection or restoration of fair equality of opportunity, this fact does not settle whether any enhancements should be covered by health insurance or other social welfare programs. The deeper issue is what are the proper focuses of attempts to achieve equality between persons, and whether any of them are forwarded by enhancements of human functions.

**Conclusion**

I shall not try in conclusion to summarize all the different respects in which I have argued human enhancement technologies may vary in ways important for public policy. The many and complex important properties of different enhancement technologies, the complex and different possible policy responses to enhancement technologies, and the different kinds of moral reasons and values that bear on them, all suggest that any policy guidelines for responding to new technologies to enhance human capacities must be highly complex and nuanced in order to take account of complexities like those I have explored in this paper.

**NOTES**


5. The discussion in this section draws on my work in “Why Not the Best?” Chapter 6 in Allen Buchanan, Dan W. Brock, Norman Daniels, and Daniel Wikler, Genes and the Just Society: Genetic Intervention in the Shadow of Eugenics, forthcoming.


