

## Posthuman Enough?

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# Posthuman Enough?

RICHARD B. NORGAARD

**C**urrent developments in genetic engineering, combined with foreseeable developments in nanotechnology and robotics, have the potential to redefine and extend human life. But if we follow this technology along the course favored by its advocates, some humans could acquire characteristics so superior to our own, or so entirely new, that what it means to be human, even for those left behind, would be forever lost. Will we say “enough” and set up the controls necessary to prevent the transformation of a portion of the human population into superpeople?

As the consequences of global warming were becoming apparent to climate scientists during the late 1980s, Bill McKibben wrote *The End of Nature* (1989), a resounding warning to laypeople that the natural world and the rich history of human relations with nature were coming to an end. Now McKibben has delivered another equally prophetic popular book. *Enough: Staying Human in an Engineered Age* (2003) portrays the possibilities, favorable and formidable, of the application of genetic engineering, nanotechnology, and robotics to people.

Though the literature on engineering a new breed of people is still relatively sparse, what has emerged is startling. Through genetic engineering, we can select an embryo with desired qualities, change the genetic traits of an embryo, and splice in desired genes from other people or even other species. Furthermore, soon we will be able to perform these tricks on embryos that are clones of ourselves. Nanotechnology may offer the possibility of rebuilding aging body parts as needed, perhaps extending a single life forever. Robotics may offer the possibility of combining human abilities with those of computers and robots. Most of us prefer not to look very deeply into such a future. There are, however, scientists, futurists, ethicists, and professional and amateur groups celebrating and encouraging human transformation. And, of course, there are also corporations striving to lead, or just to compete, in the application of genetic engineering to people.

Bill McKibben is a writer, not a scientist, futurist, or ethicist. He identifies the critical emerging technologies and portrays their significance in humanistic terms for lay readers. Most important, McKibben asks what it means to be human and why this is critical, thus making the case for saying “enough.” This book is significant precisely because McKibben writes and argues well. He can reach a very broad audience, one that could launch a moral movement to guide the uses of human engineering.

Human engineering through nanotechnology and robotics is probably a decade or two away. However, we are already beginning to engineer better people through biotechnology. We now apply genetic biotechnology to select against embryos with undesirable traits such as cystic fibrosis, sickle-cell anemia, and early-onset Alzheimer’s disease. The next steps, using similar technologies to select for positive traits, are easily foreseen. In this review, therefore, I will emphasize the moral issues raised by the application of genetic engineering to people. The foreseeable potential for applying nanotechnology and robotics only strengthens the arguments that already apply to genetic engineering.

Few argue against the use of the new genetic technologies to reduce the occurrence of disorders with consequences most of us would deem truly tragic. Those who care for people with such disorders, however, point out that tragic lives raise critical issues about what it means to be human. Tragedy also calls forth the incredible human capacity to persevere and to care. So even what seems to most people to be an unambiguously beneficial use of genetic engineering raises ethical issues. Let’s imagine, however, that we enter into a democratic debate and collectively decide that “corrective” applications of genetic engineering on people are acceptable. Taking this path of our thought experiment, we find that the distinction between correction and enhancement may be very difficult to enforce. The technologies that would be used to promote publicly determined corrective ends are pretty much the same as those that could be used to engineer the superior human characteristics some individuals might demand. Genetic engineering is not like nuclear technology, for example, which not only is high-tech but also entails large-scale processes that are difficult to conceal. Those seeking children with superior genetic traits could have them genetically engineered in any number of thousands of small laboratories identical to those that serve public goals.

So, if enforcement of the public will is going to be difficult, perhaps we should rationalize away the problem. And this is the path many argue for at this juncture. Would not most

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parents want to ensure that their children are intelligent, loving and lovable, artistic, good-looking, and athletic? Surely parents should be allowed to choose such traits that make life better. The liberal worldview favors choice, the argument goes, so let's go with the political economic philosophy of the times and not worry about the future. Unfortunately, the situation is not so simple. Human genetic engineering presents serious challenges to the liberal worldview.

Lee Silver, a Princeton University biologist, provides an excellent description of all of the current ways of using biotechnology to reduce suffering, and a foray into the future possibilities for genetic enhancement, in *Remaking Eden: Cloning and Beyond in a Brave New World* (1998). Silver also describes the potential uses of cloning and the new ways that couples, even of the same sex, will be able to produce children in the future. In *Enough*, McKibben translates the scientific analyses and technological projections of Silver and others for lay readers, but he goes beyond summarizing the essence of the science and new genetic technologies. He conveys his outrage, both at the amoral projections of the future that are portrayed as scientifically objective and at the enthusiastic arguments of the few who advocate breeding superpeople.

Silver argues early in his book that genetic enhancement is inevitable and that individual choice and market options will lead those with sufficient income to produce "GenRich" children, while most of the population remains "GenPoor." Many reviewers were critical of, even outraged by, how Silver presents such a future without making a moral denouncement or a case for social controls of genetic engineering applied to people. In an afterword to the paperback edition of *Remaking Eden*, Silver acknowledges that he is concerned about the prospect of a future with far greater inequality than we already have, and he maintains that people can individually make choices that will lead to a genetic race in which no one wins. Nor is he sanguine about all the directions "better" might take. However, he reiterates that he is simply trying to objectively project the future and argues that, in his best judgment, individual choice will prevail over some form of collective control. We will not democratically express our collective interests and develop effective policies to guide the application of biotechnology to human betterment. Even if we could democratically decide which uses of the technology are better, enforcement would be draconian or impossible. Rather, market forces will offer ever-greater genetically engineered options to those who can afford them. There will be a race among the wealthy to have

ever better offspring. And eventually a few GenRich will have astonishing capabilities, leaving the GenPoor with the relative status of imbeciles in the 19th century.

Silver is a free-market fatalist. Given how democracy in the United States has blended with a rise in corporatocracy, his prediction may prove correct. The difficulties of democratic action are further complicated by the fact that nations may end up in a "race to the top" that none would choose to enter if we could globally regulate genetic engineering of humans. Unfortunately, all nations would be threatened if one

of them started breeding supersmart people—or people who have no concerns for themselves, let alone for those they are fighting, when they go into war. A global collective compact is needed to control the application of genetic technologies to people, and forming such a compact will be even more difficult than reaching consensus within the United States.

But does the fact that resolving the problem will be difficult make free-market fatalism an objective stance? From what position can futurists simply describe a technological scenario without also being in a position, and bearing the responsibility, to argue how we should prepare for the scenario's strengths and faults and thereby change it? Has free will become simply individual choice in the market, not also in the polling booth? Have we al-

ready abandoned the modern concept that we can collectively affect our destiny? Is it not a value judgment to accept, indeed endorse, individual choice in markets, and reject a collective exercise of individual free will through the political process?

Equally important, those who make the argument that enforcement would be draconian or impossible, as Silver does, ignore what should be obvious. Murder is easily committed but socially condemned. There are laws against murder, they are rigorously enforced, and the penalties are stiff. Doctors, lawyers, and professors can, for their personal advantage, engage in behavior that society deems inappropriate, but controls are in place to penalize such behavior. Private enterprise itself breaks down, as we have recently seen, when CEOs and accountants act in their own interest, hide information from investors, and flout market rules. Social pressures, laws, enforcement mechanisms, and penalties keep inappropriate behavior in bounds. Only free-market fools think free markets can work without rules. The only question is whether the rules will be written mostly in the interests of corporations, to make markets work, or in the interests of people, to assure that public objectives also are met.

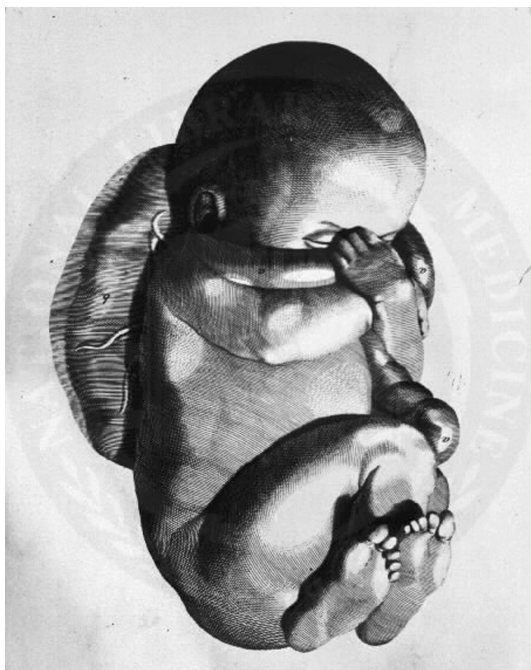


Image courtesy of the National Library of Medicine.

Silver is certainly correct in asserting that people will choose to genetically engineer their offspring if given the chance. A disturbing amount of medical technology and talent is already diverted into beauty enhancement. Amniocentesis, a prenatal test that identifies chromosomal abnormalities in fetuses, allows parents to choose whether to abort a genetically defective embryo at an early stage of development; the procedure also enables the abortion of thousands each year in Asia with the genetic “defect” of being female. Most would agree that abortion is a moral improvement over female infanticide, but now modern science and technology, and scientifically trained people, are directly intertwined with the exercise of individual choices that are socially detrimental and still immoral by many standards. Perhaps this concern will soon be obsolete. Science and education historically have been public goals and substantially publicly funded. With the privatization of education and the rise of corporate-funded research, even on the campuses of public universities, education and science are breaking their ties from criteria of the public good.

Several key arguments developed by McKibben are better covered by Francis Fukuyama, the popular political historian and futurist best known for having written *The End of History and the Last Man* (1992). Fukuyama makes an intellectual foray into what it means to be human in *Our Posthuman Future: Consequences of the Biotechnology Revolution* (2002). Querying whether our new knowledge of genetics tells us anything new about what it means to be human puts Fukuyama in the middle of the great debate as to which aspects of being human are attributable to our genes and which are not. Few things of human importance, of course, are solely determined by genes. Genes, the biological conditions of development, and culture all work together. But the debate has polarized positions along political axes, especially around issues of race and intelligence. Some progressive biologists argue, for good political reasons (though perhaps a little too assertively), that genes have little role at all in what it means to be human (Lewontin et al. 1984, Lewontin 1992, Ehrlich 2000). Yet if there are genetic strengths among us that can be exploited through genetic engineering, Fukuyama points out, another and contradictory political “take” seems necessary.

In his pursuit of the essence of human nature, Fukuyama also finds himself at odds with the “naturalistic fallacy.” David Hume argued that one cannot deduce an “ought” from an “is.” That the natural world is as it is does not provide a basis for arguing that nature ought to be left that way. For the same reasons, the way humans have been provides little basis for arguing that there is a human essence that ought to be retained. The naturalistic fallacy also rests on the argument that nature provides no moral basis for choice. Both nature and human

history have some morally repulsive aspects. For any definition of human nature that we would want to save, a moral editing of past and present human behavior is necessary, and the morals needed to do the editing cannot come from that which is to be edited. Fukuyama tries to cut through the naturalistic fallacy by arguing that our capacity to be moral, to engage in moral discourse, and to engage in moral politics is uniquely human and deserving of protection. Moving into a world of GenRich and GenPoor could destroy such moral capacity, and it would surely destroy the conditions under which they can be exercised.

Fukuyama’s arguments are more thought provoking than convincing. But some of the questions he raises with respect to biology and biologists, for example, are on track. In an age of rapid learning about human genetics and development, why are biologists protesting more and more the idea of a human nature? Why are biologists so well organized to conserve the “natural” world while arguing that humans have no nature? Does not the naturalistic fallacy apply to conserving nature? Why does protecting human

diversity and natural evolutionary potential not rank right up there with protecting biological diversity and its evolutionary potential? Indeed, are not the two intertwined (Norgaard 1994, Maffi 2001)? What are the responsibilities of biologists, and how can we shoulder them before a major milestone is crossed? Will biologists only organize late, like the physicists who organized the Federation of American Scientists well after Hiroshima and Nagasaki?

McKibben also describes how the political interests motivating the current debate on particular short-run issues in human biotechnology cloud the prospects for seriously addressing the larger long-term issues. The fundamentalist religious right is dominating the politics of research on human embryos, on stem cells derived from human embryos in their first few days, and on cloning to obtain embryos and hence stem cells. Those who oppose this research on fundamentalist grounds do not pursue scientific issues very deeply. They simply declare that embryos are humans and should be protected. Bioethicists have been summoned to the current debate, but they also have been of little help. Many come to these issues from a background in the ethics of difficult choices faced by doctors and the relatives of patients, rather than the ethics of social choices over long-term scenarios. Some bioethicists come with strong libertarian leanings that blind them to social choices. Those bioethicists with a broader view worry about the public control of our genetic makeup as they struggle with the inanities of earlier eugenics movements and the horrors of the Holocaust. There are also a few Christian theologians who are portraying genetic engineering as an opportunity for people to participate in and continue God’s project. They seem to forget

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### Web sites with information on human genetic engineering

Numerous religious, environmental, and human rights organizations, as well as trade organizations, devote portions of their Web sites to the issues of human genetic engineering, but few organizations work solely on this issue.

#### ***www.genetics-and-society.org/index.asp***

The Center for Genetics and Society provides a well-organized and informative Web site. CGS is “a nonprofit information and public affairs organization working to encourage responsible uses and effective societal governance of the new human genetic and reproductive technologies. The Center supports benign and beneficent medical applications of the new human genetic and reproductive technologies and opposes those applications that objectify and commodify human life and threaten to divide human society. The Center works...for the equitable provision of health technologies domestically and internationally; for women’s health and reproductive rights; for the protection of our children; for the rights of the disabled; and for precaution in the use of technologies that could alter the fundamental processes of the natural world.”

#### ***www.gene-watch.org/***

“The Council for Responsible Genetics fosters public debate about the social, ethical and environmental implications of genetic technologies.” Its central principles are that “the public must have access to clear and understandable information on technological innovations” and “must be able to participate in public and private decision making concerning technological developments and their implementation. New technologies must meet social needs. Problems rooted in poverty, racism, and other forms of inequality cannot be remedied by technology alone.”

#### ***www.hgalert.org/***

“Human Genetics Alert...is an independent watchdog group based in London” that provides daily coverage of new scientific, corporate, and political developments in human genetic engineering.

#### ***www.bioethics.gov/***

The Web site of the President’s Council on Bioethics contains background information on “bioethical issues that may emerge as a consequence of advances in biomedical science and technology”; council reports and a record of the activities and deliberations of the council are also available at the site.

#### ***www.bio.org/***

The Biotechnology Industry Organization presents the perspective of industry while deftly incorporating the language of human dignity and the sanctity of creation.

#### ***www.geneticalliance.org/index.html***

Genetic Alliance is billed as an international coalition of “individuals with genetic conditions and the advocacy, research and health care organizations that represent their interests”; the group is largely industry funded, with industry board members prominent. It cooperates with numerous government agencies and is a source for basic background information.

#### ***www.transhumanism.org/***

The World Transhumanist Association celebrates and promotes a posthuman future.

#### ***www.cbhd.org/***

This Web site presents a Christian fundamentalist perspective on human genetic engineering.

that the God of Jews, Christians, and Muslims declared on the sixth day that he had done enough and it was good, and he rested on the seventh. Meanwhile, many of those who know the most about the science and technology of human genetic engineering, working in the field of genetic engineering themselves, are strong supporters of their own work and blind to its larger implications. Public-interest activists are only very slowly beginning to give the issue attention. (See the box for a listing of Web sites.)

A key player in the debate today is Leon Kass, who was appointed by George W. Bush to chair the President’s Council on Bioethics. Kass is a medical doctor by training, a professor in the Committee on Social Thought at the University of Chicago, and a fellow of the American Enterprise Institute. He has authored and coauthored several books and chaired council reports. In his latest book, *Life, Liberty, and the Defense of Dignity: The Challenge for Bioethics* (Kass 2002), he lays out his own arguments clearly and forcefully. Kass argues against most reproductive technologies, not because of their consequences for society but because the processes themselves violate his interpretation of the essentials of the Judeo-Christian tradition. A majority of readers might feel comfortable with most of his conclusions, at least until we know more about the implications of human engineering. We would, however, probably disagree on what is included within the set of “most.” And, most certainly, fewer people would agree with his reasons. By concentrating on short-run issues with respect to processes rather than long-run issues with respect to outcomes, Kass’s approach is divisive rather than consensus seeking. For example, most societies throughout history have put constraints on the human urge to engage in sexual intercourse, for a variety of reasons. This does not mean that most people buy into the argument, as Kass does, that sex contributes to what it means to be human only when it is undertaken as a means of procreation in a marriage sanctified by the beliefs of subsets among those who call themselves Jews or Christians. It will be difficult enough to agree on general guidelines to constrain the consequences of human genetic engineering. If we also have to agree on all of the reasons we favor some consequences over others, the problem is far more difficult.

Bill McKibben's primary contribution is to present the long-run social consequences of genetically engineering humans in personal and immediate terms. He draws the formidable future into the daily lives we actually live. The book starts with a description of his own determination, limitations, modest accomplishments, and joys as a runner. He asks how we can possibly have self-respect and admiration for ourselves and others if what we can do is increasingly determined not by our own free will and determination but by the choices our parents, or someone else, made with respect to our genetic makeup. McKibben notes, "I have no shiny new vision to compete with the futurists who dream of making us 'posthuman'" (2003, p. 109). Instead, he makes the argument for saying "enough." He passionately argues and documents that we can put the long-run public good before short-run greed. He makes it very clear that decisions need to be taken now that will affect our future path, but also that not all of the decisions need to be made at once and that decisions can be modified as we learn more. Democratically muddling through will work, so long as we do not lose sight of the big long-run issues. The intensity of McKibben's argument rarely flags; his final chapter is as gripping as his first.

While the case for "enough" should certainly be made, an alternative vision would also help. In the face of strong beliefs in progress, modern people have long avoided asking, "What kind of people do we want to be?" A decade ago, in *Development Betrayed: The End of Progress and a Coevolutionary Revisioning of the Future* (Norgaard 1994), I presented a vision of people and nature once again coevolving together, as we had for 99.995 percent of human history. A mere 150 years ago, we switched to living off fossil fuels. This drove a wedge into the coevolution of people and nature while also setting up some highly detrimental feedbacks from people back to the natural world. We continue to try to correct those feedbacks, but we have yet to think seriously about what it might mean to try to coevolve with nature again. Human genetic engineering is a new wedge that could redefine how we relate to each other and to nature. Biological understanding can give us a bigger picture that can help us think about who we have been and who we want to be.

All reasonably educated people should be thinking about the future of humanity at least at the level of McKibben's book. We can disagree with his arguments after we have educated ourselves to the level that he has attained. For those who want to go deeper into the technological prospects and moral issues, McKibben provides a good review of the literature, and his endnotes are extensive. However, I find the list of references in Fukuyama's *Our Posthuman Future* more accessible. Silver's *Remaking Eden* is becoming dated but is still a good source for a detailed description of the science and technology of human engineering. For those who are already in the moral debate, *Enough* demonstrates a style of argument that will surely be a model for other writers. It is an obvious book for those few (far too few) undergraduate biology programs

with courses, or sections of courses, that delve into the social responsibilities of being a biologist. Environmental studies and general education curricula should be exploring the future prospects and moral issues raised by human engineering, and this book is an ideal start. *Enough* deserves to be the *Silent Spring* of the early 21st century.

I complete this review between destinations, in transit in Singapore for a day at the onset of the Chinese New Year. Not far from my hotel, several dance and acrobatic troupes from China perform on a stage in the middle of the Raffles City Shopping Centre. I marvel at the very young children, only five or six years old, already performing with confidence; the seven just pubescent girls, all of exactly the same height and build and with very similar facial features; and the dozen young men and women, all tall and slender. They perform exceedingly complicated, sometimes contorted, sometimes acrobatic, yet always artistic movements precisely together. I realize the troupes are able to draw from an immense population of 1.2 billion people. I ponder the ways in which the performers and performance are a product of Chinese culture and institutions, with their long and difficult history and their signs of major changes under way, some more favorable than others. And within this big picture, I see the determination on the young faces of the individual performers and admire the passion with which they have practiced, sacrificing time with family and other educational opportunities. These are difficult choices under difficult conditions. Will my own children at my age so marvel when we can not only breed identical dancers but also breed them with the genetic traits that will substantially reduce the determination and training needed to perform as these children do? Will my children admire the individual determination and ponder the cultural history, or will they just wonder where these performers got their genes?

## References cited

- Ehrlich PR. 2000. Human Natures: Genes, Cultures, and the Human Prospect. Washington (DC): Island Press.
- Fukuyama F. 1992. The End of History and the Last Man. New York: Free Press.
- . 2002. Our Posthuman Future: Consequences of the Biotechnology Revolution. New York: Farrar, Strauss and Giroux.
- Kass L. 2002. Life, Liberty, and the Defense of Dignity: The Challenge of Bioethics. San Francisco: Encounter Books.
- Lewontin RC. 1992. The Doctrine of DNA: Biology as Ideology. New York: Harper Perennial.
- Lewontin RC, Rose S, Kamin LJ. 1984. Not in Our Genes: Biology, Ideology, and Human Nature. New York: Pantheon.
- Maffi L, ed. 2001. On Biocultural Diversity: Linking Language, Knowledge, and the Environment. Washington (DC): Smithsonian.
- McKibben B. 1989. The End of Nature. New York: Random House.
- . 2003. Enough: Staying Human in an Engineered Age. New York: Times Books.
- Norgaard RB. 1994. Development Betrayed: The End of Progress and a Coevolutionary Revisioning of the Future. London: Routledge.
- Silver LM. 1998. Remaking Eden: Cloning and Beyond in a Brave New World. New York: Avon.