

Human Nature is Here to Stay

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The power of biotechnology for changing human nature has been exaggerated. The most fervent advocates of biotechnology welcome the prospect of using it to transform our nature to make us superhuman. The most fervent critics of biotechnology warn us that its power for transforming our nature will seduce us into a Faustian bargain that will dehumanize us. Both sides agree that biotechnology is leading us to a “posthuman future.” But this assumption is false. It ignores how evolution has shaped the adaptive complexity of our human nature—our bodies, our brains, and our desires—in ways that resist technological manipulation. A Darwinian view of human nature—one truer to the facts of human biology and human experience—reveals the limits of biotechnology, so that we can reject both the redemptive hopes of its advocates and the apocalyptic fears of its critics.

Biotechnology will be limited both in its technical means and in its moral ends. It will be limited in its technical means because complex behavioral traits are rooted in the intricate interplay of many genes, which interact with developmental contingencies and unique life histories to form brains that respond flexibly to changing circumstances. Consequently, precise technological manipulation of human nature to enhance desirable traits while avoiding undesirable side effects will be very difficult if not impossible. Biotechnology will also be limited in its moral ends, because the motivation for biotechnological manipulations will come from the same natural desires that have always characterized human nature.

Bodies, Brains, and Evolution

In the first issue of *The New Atlantis*, Leon Kass suggests that if biotechnology were to transform human nature, it would do so to satisfy the human dream of physical and mental perfection—“ageless bodies, happy souls.” But how likely is that? As an indication of what he foresees, Kass says that with drugs, “we can eliminate psychic distress, we can produce states of transient euphoria, and we can engineer more permanent conditions of good cheer, optimism, and contentment.” He refers to those “powerful yet seemingly safe anti-depressant and mood brighteners like Prozac, capable in some people of utterly changing their outlook on life from that of Eeyore to that of Mary Poppins.” Similarly, psychiatrist Peter Kramer—in his best-selling book *Listening to Prozac*—described patients using

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Prozac who were not just cured of depression but so transformed in their personalities as to be “better than well.” Shy, quiet people were apparently turned into ebullient and socially engaging people. “Like Garrison Keillor’s marvelous Powdermilk biscuits,” Kramer observed, “Prozac gives these patients the courage to do what needs to be done.” This was the beginning, he concluded, of “cosmetic psychopharmacology,” by which people could use chemicals to take on whatever personality they might prefer.

But as even Kramer has conceded, this chemical transformation in personality appears to work well in only a minority of the people taking Prozac. And in recent years, there have been increasing reports of many harmful side effects. This is to be expected, because like all psychotropic drugs, Prozac disrupts the normal functioning of the brain, and the brain responds by countering the effect of the drug, which then induces harmful distortions in the neural system. Specifically, Prozac blocks the normal removal of the neurotransmitter serotonin from the space between nerve cells. This creates an overabundance of serotonin, and the brain responds either by reducing receptivity to serotonin or by reducing the production of serotonin. As a result, the brain creates an imbalance in response to the disruption of the drug and cannot function normally. There is also growing evidence that Prozac does not really cure depression. Many studies have shown that the antidepressant effects of taking Prozac are not much greater than what occurs when people take a placebo pill.

But the most fundamental problem with Prozac is one that it shares with all psychotropic drugs (including old-fashioned ones like alcohol). Emotional suffering is a capacity of human nature shaped by evolutionary history for an adaptive purpose. Emotional suffering is almost always a signal that something is wrong in our lives. It alerts us that there is some problem either in our internal lives, in our social relationships, or in our external circumstances. A psychotropic drug does not help us to understand or solve the problem. Rather, the drug deadens the emotional response of our brain without changing the problem that provoked the emotional response in the first place. When we feel bad because of a problem in our lives, taking a psychotropic drug to make us feel better is evasive and self-defeating. As mature adults, we can understand this in the case of old drugs like alcohol; the same lesson applies to even the newest drugs of the mind like Prozac. But even if critics like Kass are wrong to suggest that psychotropic drugs could change human nature, they are right to worry about the bad effects of such drugs on people who use them to “numb” the sharp edges of reality, if only temporarily. And they are warranted to question a biotechnological approach to life that sacrifices truthfulness in favor of dulling “psychic distress.” In the end, however, these critics overestimate just how effective—and how desirable—such drugs really are or will become.

Just as the biotechnological quest for “happy souls” is limited by the adaptive complexity of the brain, so is the biotechnological quest for “ageless bodies” lim-

ited by the adaptive complexity of the body. The success of modern public health and modern medicine in extending life expectancy might suggest that if we continue in this direction, eventually we can conquer death completely. But while we have increased the *average* length of life, we have not increased the *maximum* length of life. Compared with populations in previous centuries, more of us are living into our 80s and 90s. And yet by age 100, 99 percent of us will be dead; and by age 120, we will all be dead. The maximum lifespan is the same today as it has been for thousands of years. This confirms the wisdom of God's declaration in the Bible: "My spirit shall not always strive with man, for that he is also flesh: yet his days shall be an hundred and twenty years" (Genesis 6:3).

Senescence—the process of bodily decay at older ages—is probably so deeply rooted in the adaptive complexity of our bodies that it cannot be abolished by biotechnological changes. It is likely that aging is controlled by so many genes interacting in such complex ways that it would be hard to eliminate the genetic mechanisms for aging, and thus to greatly lengthen the lifespan, without disrupting other beneficial mechanisms.

Last year, *Scientific American* published a statement by 51 leading researchers in the science of aging who declared that there was "no truth to the fountain of youth." They reasoned that "it is inescapable biological reality that once the engine of life switches on, the body inevitably sows the seeds of its own destruction." Since there is no scientifically proven way to stop the process of aging, "the prospect of humans living forever is as unlikely today as it has always been."

One plausible evolutionary explanation for senescence has been offered by biologist George Williams. Genes commonly have more than one effect. A gene might confer great benefits at young ages but have such harmful effects in old age that few people could live past 100. In the environments of evolutionary history, most people probably died (from accidents and other causes) long before they could even get close to age 100. In these conditions, this gene would spread by natural selection because people would enjoy its beneficial effects in youth, in ways that would enhance their reproductive fitness, while few people would live long enough to experience the gene's bad effects. The accumulation over evolutionary history of such genes that are beneficial in youth but harmful in old age might explain the aging process. The general idea is that the evolutionary economy of nature works on the principle of trade-offs between costs and benefits. To get youthful energy, we must accept senescent decline. Williams suggests that we should find consolation in the thought that "senescence is the price we pay for vigor in youth." Instead of longing to live forever, we might desire to live the life we have as fully as we can until we reach our completion.

Our Natural Desires

The desire for a complete life is one of many desires that belong to our biological human nature. As I argued more fully in my book *Darwinian Natural Right*,

natural selection has shaped human nature to express at least twenty natural desires that are manifested in diverse ways in all human societies throughout history. Human beings generally desire a complete life, parental care, sexual identity, sexual mating, familial bonding, friendship, social ranking, justice as reciprocity, political rule, war, health, beauty, wealth, speech, practical habituation, practical reasoning, practical arts, aesthetic pleasure, religious understanding, and intellectual understanding.

To illustrate what I mean, consider the first two desires on my list—a complete life and parental care. Human beings generally desire life. Like other animals, they pass through a life cycle from birth to maturity to death. Every human society is organized to manage the changing desires associated with this life cycle, which passes through distinct stages such as infancy, childhood, adolescence, adulthood, and old age. Children, adults, and the elderly have different desires, and to satisfy those desires they must fill different roles in society. Human beings will risk their lives for a good cause. And yet they generally agree that to be fully happy one must live out one's natural lifespan.

Human beings also generally desire to care for children. Human life would be impossible without parental care of the young. A large portion of the activity and resources of every human society is devoted to parental care and familial life generally. Children desire the care of adults. And although parental caregiving is often onerous, most human adults desire to provide such care, especially for those children to whom they have some affiliative bond—either those to whom they are related by kinship or those to whom they have developed some adoptive attachment.

Such desires are so deeply woven into the adaptive complexity of human nature that they are not likely to be radically changed by biotechnology. On the contrary, we should expect that biotechnology—as well as all forms of technology—will be used to satisfy those natural human desires: to preserve life, to assist parental care, to improve one's sexual chances, and so on. Since our natural desires provide our ultimate motivations for action, it is hard to see why we would use biotechnology to abolish them.

Biotechnology is also an expression of our natural desire for practical arts. Every human society depends on making and using tools to control natural resources for human benefit. Some of the basic tools—such as cutters, pounders, levers, containers, and weapons such as projectiles—are universal. Some tools are made in uniform patterns of artistic style. As animals naturally adapted for craft and artifice, human beings enjoy producing and seeing products of practical skill. Technology and engineering express this natural desire. Throughout the history of the human species, human beings have artificially manipulated plants and animals to adapt them to human desires. We can see this in the human breeding of plants and animals to create forms of life that would not have exist-

ed without such human manipulation. Modern biotechnology is a more technically advanced form of this older biotechnology.

The view that biotechnology is embedded within, and thus limited by, our natural human desires—desires shaped by Darwinian evolution—stands in opposition to the exaggerated optimism of some proponents of biotechnology and the exaggerated pessimism of some critics. Both the optimists and the pessimists assume that biotechnology will abolish human nature in the quest for a “posthuman” condition. Francis Bacon’s “New Atlantis” is a classic text of exaggerated optimism; Aldous Huxley’s *Brave New World* is a classic text of exaggerated pessimism; both shed light on how exaggerated hopes and fears continue to confuse the contemporary debate over biotechnology.

Misguided Optimism

The title of this journal reminds us of the importance of Bacon’s “New Atlantis” as the first depiction of a society governed by the use of modern science and technology to conquer nature for human benefit. “New Atlantis” (first published in 1627) is the utopian story of some European sailors who discover the island of Bensalem in the South Pacific. The people of Bensalem seem completely happy. This is due primarily to the science and technology that come from “Salomon’s House,” which we today would recognize as a scientific research institute.

The Father of Salomon’s House describes the extensive scientific projects undertaken there for the experimental study of the physical and living world around them. He declares the purpose of this work to be twofold—“the knowledge of Causes, and secret motions of things; and the enlarging of the bounds of Human Empire, to the effecting of all things possible.” The first aim is theoretical—the understanding of natural causes for its own sake. The second is practical—the use of the scientific understanding of natural causes for ruling over nature. Although Bacon emphasizes the practical power of scientific knowledge, he also affirms the worth of theoretical understanding as an end in itself. He begins his *Essays* by insisting that the pursuit of truth for its own sake is “the sovereign good of human nature.”

The social, economic, religious, and political aspects of life in Bensalem are all organized to sustain and benefit from the scientific knowledge and technological power provided by Salomon’s House. The inventions coming from Salomon’s House include flying machines, boats that move underwater, robotic mechanisms, medicinal drugs, powerful weapons of destruction, and artificially designed plants and animals. Many of the inventions are for preserving bodily health, curing diseases, and prolonging life. The technological mastery of nature has managed to make life in Bensalem free, healthy, pleasurable, and peaceful.

Bacon wrote “New Atlantis” to make Bensalem look like an earthly paradise. And yet any careful reader notices intimations of a darker side to life on this

island. Although the Bensalemites appear to be peaceful, they have fought wars in the past, and their scientific technologists develop destructive weapons, suggesting that they must always be prepared for war. The people of Bensalem cooperate freely, and yet there is a social and political hierarchy in which higher ranked people give commands to lower ranked people, which implies coercive authority. People talk about a king who never appears. And generally the government operates behind the scenes. Their economic prosperity seems to arise from a well-organized system of labor, management, investment, and commerce; and yet Bacon tells us nothing about how economic conflicts are resolved. Those in Salomon's House are under an oath of secrecy, and they meet to decide which experiments and inventions will be made public and which not. Bensalem cannot be a completely free and open society.

Moreover, the power of technology over nature in Bensalem has not brought about any radical change in human nature. The people in Bensalem are moved by all of the natural human desires that have always moved human beings. For example, the natural desires for sexual mating, parental care, and familial bonding are satisfied in monogamous marriages and patriarchal families. The natural desire for social ranking is satisfied by a hierarchy of authority and recognition that honors people for their public service. Even the most successful inventors in Salomon's House are rewarded with statues honoring their work. The natural desire for religious understanding is satisfied by a religious life rooted in the Jewish and Christian traditions of the Bible. The many references to Solomon remind us of the Biblical king of Israel whose wisdom included a scientific knowledge of nature and a technological expertise manifested in the building of a great temple and palace. And the natural desire for intellectual understanding is satisfied most fully by those scientists in Salomon's House who seek the knowledge of causes.

The talk about inventions for prolonging life and the silence about death suggest to some readers that the Bensalemites have changed human nature in at least one crucial respect: they have achieved bodily immortality. But there are many hints in "New Atlantis" that although Salomon's House has been at work for over 1,900 years, there has been no extension of the human lifespan. Some people are much older than others. Special drinks are brewed for the pleasure of the old. And, apparently, those statues of great inventors in Salomon's House are images of the dead. In Bacon's essay "Of Death," he observes that there is no natural necessity for human beings to fear death. After all, many passions prompt us to risk our lives with no fear of death. And generally what we fear about death is not death itself but the pains often associated with it. Bacon concludes, "it is as natural to die as to be born."

So even in Bacon's optimistic vision of how the technological conquest of nature could transform the human condition, we see no essential change in those

natural human desires that constitute the core of human nature. Bacon himself seemed to understand this fact, even as he helped lay the groundwork for a new science aimed precisely at reconstituting man's understanding of and powers over the natural world, including the workings of man himself. And yet, three hundred years later, Aldous Huxley's darker vision of a scientific society suggested that the technological power for changing human nature might turn out to be much greater than Bacon had imagined.

Misguided Pessimism

In the first issue of this journal, the phrase "Brave New World" appears nine times. This reminds us of the remarkable influence of Huxley's novel in the continuing debate over the moral implications of science and technology.

Brave New World (first published in 1932) is a novel about an imaginary World State in the future where a combination of genetic manipulation and social conditioning has produced a stable industrialized society governed by the political slogan that "everyone belongs to everyone else." Human eggs are fertilized in laboratories and then incubated under varying conditions for the mass production of people who are shaped to fill their social caste roles as Alphas, Betas, Gammas, Deltas, or Epsilons. Some people have been cloned from the same fertilized egg, so that they are genetically identical. The higher castes fill managerial roles, and a few of these become Controllers ruling over the World State. The lower castes fill menial roles. There are no parental or familial attachments. The idea of being born to a mother after developing in her womb is considered obscene and primitive. People are free from the emotional conflicts of family life. Since everyone is conditioned to fill an assigned role, they all feel happy doing what they do, and there is no class conflict. There are many amusements to keep people satisfied and entertained, including the "Feelies," movies that arouse audiences not only visually and audibly but also tactilely. Sexual promiscuity is a social duty, and people derive recreational pleasure from having hundreds of sexual partners over their life. Anyone who might feel a little anxious or sad takes the drug "soma," which induces blissful euphoria and allows people to "escape from reality" for long periods without any painful aftereffects. There is no interest in traditional art or religion, because people have never felt the intense suffering or conflicts that awaken the aesthetic or religious impulse.

A few individuals rebel against this social conformity and emotional shallowness, and they desire the intense emotions of romantic love, art, religion, or pure science. If they become too disruptive, they can be exiled to distant islands. One of the rebels is John the Savage, who was born "naturally" to a woman and raised on an Indian Reservation in New Mexico before being brought to London. The Savage has educated himself by reading Shakespeare's plays, which give him poetic language to express his deep longings. The Savage meets Mustapha

Mond, the World Controller for Western Europe. Mond shares the Savage's interest in art and religion. Mond has also been moved by a love of pure science for its own sake that cannot be satisfied by the applied science and technology promoted in the World State. As a young man, Mond could have been exiled to an island for rebels, but he decided to sacrifice his personal happiness to become a Controller who would rule for the greater happiness of the World State.

Huxley's novel is a satirical depiction of the sort of scientific utopias that were predicted by people like H. G. Wells and J. B. S. Haldane at the beginning of the twentieth century. The novel arouses disgust in its readers because most of the people in this Huxleyan world have been dehumanized into "happy slaves." In his 1958 collection of essays *Brave New World Revisited*, Huxley said that the world described in his novel was contrary to "man's biological nature," because it treated human beings as if they were social insects rather than mammals. Social insects such as bees, ants, and termites naturally cooperate for the good of the social whole as greater than its individual members. But mammals are only "moderately gregarious," Huxley observed, in that they can cooperate with one another, but they will never subordinate their individual interests totally to the community. In social insect colonies, reproduction is communal (through the queen), so that most of the insects do not reproduce and thus do not feel any personal attachment to offspring. Among mammals, however, individuals produce offspring directly and feel a parental attachment to them. As big-brained mammals, human beings must devise social arrangements for balancing social order and individual freedom. *Brave New World* shows how dehumanizing it would be for human beings to be so designed that they gave up individual freedom for the stable order of a social insect colony.

The very fact that people in *Brave New World* need soma as an "escape from reality" indicates that the World State has not succeeded in abolishing their mammalian nature and turning them into social insects. Taking too much soma shortens their life expectancy. And although no one shows the debilitating effects of aging, everyone dies. So from infancy, people have to be conditioned not to fear death.

Any careful reader of Huxley's novel can see intimations of all those natural desires that distinguish the human species, most clearly expressed in the many individuals who have to be sent into exile on remote islands. Even a World Controller like Mond feels those desires, which leaves us wondering why he would take a ruling office that makes him unhappy. (In this respect, he is like the philosopher-king in Plato's *Republic*, who must sacrifice his love for the philosophic life to rule for the public good.)

In the end, the idea that biotechnology is leading us to Huxley's brave new world is implausible, because it is hard to see how social arrangements so contrary to human nature could ever succeed. Why would human beings choose to turn themselves into social insects?

The Current Debate

The contrast between Bacon's optimism and Huxley's pessimism continues to dominate today's moral debate over biotechnology. The Baconian optimists are led by libertarians like Lee Silver, Gregory Stock, and Ronald Bailey. The Huxleyan pessimists are led by neoconservatives like Leon Kass, Francis Fukuyama, and William Kristol, and by environmentalists like Bill McKibben and Jeremy Rifkin. Both sides make the exaggerated claim that biotechnology is heading us towards the abolition of human nature.

As suggested by the title of his book *Remaking Eden*, Lee Silver foresees that biotechnology will soon give us the god-like power to recreate ourselves into whatever form we might want. He makes the libertarian argument that if we respect individual freedom of choice, then we must allow people to use reproductive technology in any way they choose, as long as they do not directly harm anyone else. This would allow parents to produce "designer children" with the traits of body and mind that the parents desire.

But when Silver speaks of the power of biotechnology for changing human nature, he exaggerates both the technical possibilities and the moral ends that would motivate people to use biotechnology in the first place. With respect to the technical means, the following comment from Silver is typical: "[S]ome of the ideas proposed here may ultimately be technically impossible or exceedingly difficult to implement. On the other hand, there are sure to be technological breakthroughs that no one can imagine now." Well, maybe. Or, maybe not. This is the rhetoric of hand-waving: it's not possible now, but surely sometime in the future there will be "technological breakthroughs" to make it possible. This kind of rhetorical move allows an author to spin out imaginative scenarios based on purely speculative assumptions about the future.

Silver also exaggerates in suggesting that the basic motivations for human behavior will be completely remade. Indeed, the plausibility of Silver's argument depends on the assumption that the new reproductive technology will be guided by the same natural desires of the human animal that have always moved human beings. He repeatedly speaks of the "desire to have a child" as a "natural instinct" or "essential human desire" that has been shaped by evolutionary history as an enduring trait of human nature. Although biotechnology will provide us with new means to satisfy this desire, the end is still set by our parental desire to produce and care for our children in ways that enhance their health and happiness. The technological means should be judged good, Silver argues, as long as they serve naturally good ends. The implication of this argument should be clear: When Silver speaks of biotechnology as giving us "the power to change the nature of humankind," he does not really mean what he says, because he assumes that the human desire to care for one's own children will continue to direct human reproduction and child-rearing just as it has throughout human history.

Gregory Stock, another prominent figure in the biotechnology debate, agrees with Silver in defending a libertarian attitude toward human reproductive biotechnology. And just like Silver, he exaggerates. In his book *Redesigning Humans*, Stock declares that “the arrival of safe, reliable germline technology will signal the beginning of human self-design.” He admits, however, that “our biology might prove too complex to rework.” He concedes that “no present genetic intervention is worth doing in a healthy individual, and no present technology is capable of effecting an intervention safely anyway.” He acknowledges that many biologists believe that the genetic propensities underlying complex behavioral traits, such as personality and intelligence, are so intricate that we could never intervene to change these mechanisms without producing undesirable side effects. He also recognizes that these genetic propensities always interact in unpredictable ways with chance events and life history to produce unique individuals who cannot be controlled or manufactured by genetic technology. “Even for highly heritable traits,” he observes, “it will be uncertain what a child’s unique amalgam of potential and experience will bring. A vision of parents sitting before a catalog and picking out the personality of their future ‘designer child’ is false.”

But just when it seems that he has given up on the idea of “human self-design” through genetic technology, Stock suggests that the “technological barriers soon may fall.” We might someday develop an artificial human chromosome and thus find a way to use our new mastery of genetics to change the complex behavioral traits of our children. In describing these technological novelties of the future, he uses words such as “may,” “might,” “probably,” and “ideally” in almost every paragraph of his writing. He writes: “At this time, human germline manipulation is not feasible or safe. A decade from now, it still won’t be. Two or three decades hence, however, the story may be different.” So in 30 years, we might be able to do what today is impossible. Well, maybe. Or, maybe not. As with Silver, it’s hard to know how to respond to Stock’s speculative scenarios, except to identify them as nothing more than speculative scenarios.

Stock also suggests that “redesigning humans” through genetic manipulation will include redesigning their fundamental motivations. But then he pulls back from this exaggerated assertion, and argues instead that choices about using reproductive technology to change the human germline will be made by parents moved by the same natural desires that have always been part of human nature. He writes: “To figure out which traits we will want for our children once we have the power to make such choices, we must think long and hard about who we are. Our evolutionary past speaks to us through our biology and fashions our underlying desires and drives.” He then lists some of the “desires and drives” instilled in us by Darwinian evolution. The list includes sexual mating, parental care, familial bonding, status, power, wealth, and beauty—the same natural desires, rooted in our Darwinian human nature, described above.

In the end, the persuasiveness of Stock's argument depends on his implicit claim that while parents will sometimes make mistakes in how they use new reproductive technologies, we can generally rely on their good judgment and common sense, because they will be guided by the same natural desires that have always constituted the ground for moral experience. If modification of the human germline arises from parental choice, Stock tells us, then we can trust that such changes or enhancements will fall "within the range of normal human performance." But if so, then the project for "redesigning humans" has not abolished human nature after all. As long as the human beings using biotechnology do so in the service of their natural desires, their technical means might be new, but their moral ends will be rooted in the enduring desires of human nature.

Bill McKibben would seem to be radically opposed to the positions of Silver and Stock. In his recent book *Enough: Staying Human in an Engineered Age*, McKibben argues that we need to limit our technological power over human life by deciding that we already have "enough." If we don't set limits—now, not later—then our growing biotechnological power will soon destroy our human identity. We will become like robots, and life will be meaningless.

And yet the urgency of McKibben's argument depends precisely on his agreeing with those who celebrate the possibility of biotechnology to transform human nature. In much of his book, he simply paraphrases or quotes from Silver, Stock, and others who think technology is moving us into posthumanity. He then concludes: "The technoprophets have made a persuasive case that we will soon be able to leave humanness behind." He naïvely reports that scientists "are already hot on the trail of a human 'happiness gene,'" and that "it's not particularly far out to imagine genetic engineering designed to make our children happier." But scientifically, this is nonsense.

As is common for those who foresee the use of biotechnology to produce "designer babies," McKibben ignores the adaptive complexity of mental traits that arise from many interacting and unpredictable causes and that are not amenable to precise genetic manipulation. For example, McKibben predicts that soon parents will be able to increase the innate intelligence of their children by genetic engineering. He cites the work of psychologist Robert Plomin, who announced in a 1998 article that differences in a gene on chromosome 6 could account for two percent of the difference between a group of children with high IQ scores and another group with lower scores. McKibben fails, however, to tell his readers that Plomin's finding has never been replicated by any other researchers. Furthermore, in the fall of 2002, Plomin retracted his 1998 report, because he had failed to replicate it himself. Recently, Plomin has admitted that in searching for genes that influence intelligence, "the track record for replicating candidate gene associations is not good." Plomin has also conceded that intelligence is controlled by so many genes, each of which exerts such a small

effect, that it might never be possible to identify exactly the genetic basis of intelligence.

Even if we could explain exactly the multiple genetic causes of intelligence, we would still have to explain how those genes influence neural activity and how genetic propensities and neural activity interact with environmental contingencies in the unique life histories of particular human beings. And all of this would presuppose that we could agree on how to define and measure “intelligence,” even though both scientific research and common-sense experience suggest that there are different kinds of intelligence (e.g., analytic intelligence, verbal intelligence, practical intelligence, musical intelligence, and kinesthetic intelligence). Moreover, since our intellectual activity requires a subtle interaction of reason and emotion, we cannot explain intelligence without also explaining emotion. We should expect such complexity in the workings of human intelligence, because we have been endowed by natural selection with a cognitive flexibility that allows us to monitor and respond appropriately to the intricate and ever-changing physical and social circumstances of human life. The rhetorical power of McKibben’s jeremiad requires that he ignore all of these complications. He claims to defend human nature, but only by ignoring its biological complexity.

Like McKibben, neoconservatives like Francis Fukuyama accept the biotechnological prophecies of people such as Silver and Stock. In his book *Our Posthuman Future*, Fukuyama admits, “we do not today have the ability to modify human nature in any significant way, and it may turn out that the human race will never achieve this ability.” He then adds, however, that genetic engineering to change human nature might become possible in a hundred years. Well, maybe. Or, maybe not.

Fukuyama insists that we can regulate biotechnology by appealing to human nature—to promote what is desirable and discourage what is unnatural. He rejects the idea that human nature is constituted by a discernible number of natural desires. “Such lists,” he claims, “are likely to be controversial; they tend either to be too short and general, or overly specific and lacking in universality.” What we need to know, he says, is the “Factor X” that makes human beings unique in a way that gives them moral dignity. He then goes through a list of possible traits that would qualify as “Factor X”: reason, language, consciousness, moral choice, human emotions, and other factors. He finally concludes that what is decisive is not any one of these traits but the full gamut of traits that constitute “the human whole.” In the end, this gamut of traits resembles the very Darwinian natural desires described above—the desire to care for children, for social recognition, for political rule, and so on. On this point, Fukuyama and I seem to agree. The major difference is whether one believes that biotechnology can change these natural desires or not.

To believe that we are heading for a “posthuman” future—where human

nature as we know it will be abolished or transformed—one must accept the premise that our own biotechnical inventions are powerful enough and subtle enough to transform the complex biological natures that define who we are and what we desire. But these natural desires, which Fukuyama is correct to recognize, are more lasting and deeply rooted than he admits. The new biotechnology (like all new technologies) might allow us to bring misery and confusion into individual lives in new ways. People can try to revolt against their own true nature. But in the end, there is no reason to believe that biotechnology will allow us to become different beings altogether with different desires. Human nature, despite what the bio-optimists and bio-pessimists both want us to believe, is not so easily altered.

The Magic of the Extreme

If I am right that the biotechnological manipulation of human life will always be limited in its technical means and moral ends by the adaptive complexity of human nature, then one must wonder why so many people are forecasting the biotechnological abolition of humanity. The answer, I think, is that it stirs a Nietzschean excitement that has seduced many of us for the past century. Friedrich Nietzsche declared: “The spell that fights on our behalf, the eye of Venus that charms and blinds even our opponents, is the *magic of the extreme*, the seduction that everything extreme exercises: we immoralists—we are the most extreme.”

The extremism of Nietzsche’s immoralism was in his proclaiming that morality could no longer be rooted in human nature, because in the future human nature would be transformed, if not abolished altogether. The consequence of this would be either a collapse down to the subhuman hedonism of the “last man” or an elevation up to the superhuman heroism of the “superman.” In the debate over biotechnology, the Baconian optimists await with hope the coming of the “superman,” while the Huxleyan pessimists await with fear the coming of the “last man.” Both sides have been seduced by Nietzschean prophecies that have no ground in observable experience or scientific reality.

Fukuyama speaks about the “human moral sense” rooted in human nature. But then he observes: “It may be the case that, as Nietzsche predicted, we are fated to move beyond this moral sense. But if so, we need to accept the consequences of the abandonment of natural standards for right and wrong forthrightly and recognize, as Nietzsche did, that this may lead us into territory that many of us don’t want to visit.”

I have never seen any proof in Nietzsche’s writing that we are “fated” to move towards “the abandonment of natural standards for right and wrong.” Those under Nietzsche’s magical spell of extremism see biotechnology as confirming his prediction. But if we could break free of that spell, we could see that

biotechnology is not likely to bring radical changes in the human condition. If we could give up both our exaggerated hopes and our exaggerated fears, we could begin a more sober deliberation about how we might put our new technological powers into the service of our natural desires.