

Redesigning Humans: Is It Inevitable?

Is genetic technology just the next step in human discovery about ourselves, or does it mean the end of humanity as we know it? Could we literally redesign humanity out of existence? On the other hand, there are those who maintain that we are headed down a disastrous technological and ethical road.



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The People Are Restless

There is a general unease in the wind. People are a little squeamish concerning the coming revolution in biotechnology. There is a sort of stand-offish fascination where we wonder at the possibilities for curing genetic diseases and even for making ourselves smarter, prettier, or stronger. Yet we shrink from the potential horror of the world we might create for ourselves with no hope of turning back.

We have faced such forks in the road before. Every new technology has presented fantastic benefits and uncertain costs. Gunpowder, electricity, the combustion engine, atomic energy, etc., have all offered tantalizing either/or tensions. Some of these tensions we still live with, such as the threat of nuclear weapons and encroaching pollution from combustion engines.



But for the most part we have been able to develop a stable coexistence between the potential for good and the potential for evil. Weapons have become more precise, minimizing unnecessary collateral casualties, the combustion engine has become cleaner and more efficient, and atomic weapons so far

have been remarkably harnessed.

But what about genetic technology? Is this just the next step in human discovery about ourselves, or does it mean the end of humanity as we know it? Could we literally redesign humanity out of existence? There are voices in our culture today that will tell us that indeed we can and we will and it is inevitable and "you'd just better get used to it."

On the other hand there are those who maintain that we are headed down a disastrous road, and that we have a small opportunity to harness the benefits of the new technologies while minimizing and corralling the hazards.

I recently spent several days at the United World College in New Mexico developed by the late Armand Hammer, one of several upper high schools around the world for the best and brightest. The occasion was a student-led conference organized for discussing the ethics of human genetic engineering and cloning. Three other invited guest speakers and I spent two days with the 200 students from around the world and the UWC faculty and staff.

About fifty of the students were from a variety of backgrounds from here in the U.S., and the other 150 were from almost ninety countries. Their knowledge and perspectives on human genetic engineering ran from those who saw few problems and were perplexed by those with reservations to those who held all such technologies at arm's length and couldn't understand why anyone would want to do such things.

Who's right? Beyond that, What have we done already? And is there any opportunity for science and society to meet together to figure this out? In this program we will hear from several voices and see if we can navigate the coming genetic mine fields.

Is There a Posthuman Future?

One of participants at the UWC conference designated himself a “transhumanist.” Transhumanists are among those who welcome with open arms the possibilities of genetic engineering to alter who and what we are. They scoff at the reluctance of others to step into this coming Brave New World. They relish the possibilities of double and triple average life-expectancy, designer babies, and the elimination of genetic disease. They aren’t troubled by the necessity of costly mistakes and failures. That’s just the price of research and progress. We accept risk all the time, they say. Why should genetic research be any different? They apply rather consistently a naturalistic worldview which sees human beings as just another species. We certainly aren’t made in the image of God, they say, so why is our current genetic structure sacred?

Gregory Stock opened his 2002 book, *Redesigning Humans: Our Inevitable Genetic Future*, this way: “We know that *homo sapiens* is not the final word in primate evolution, but few have grasped that we are on the cusp of profound biological change, poised to transcend our current form and character to destinations of new imagination.”[\[1\]](#)

Stock rightly points out that we have already started down the road of genetic manipulation of our species. Several fertility clinics in the U.S. already offer preimplantation genetic diagnosis or PGD. This procedure screens newly created embryos by in vitro fertilization for a few genetic diseases such as Tay Sachs, cystic fibrosis, and hemophilia. You can also have the embryos screened for sex selection. Some clinics even offer sex selection as the sole purpose of your visit to the clinic.

One couple from Wyoming had fourteen embryos created by in vitro. Seven were male, seven were female. They chose three females to be implanted to ensure their fourth child was a

girl after three boys. The technique is virtually 100% effective. Less efficient sperm selection techniques are only 91% effective for girls and only 76% effective for boys.^{2} But should we be selecting the sex of our children?

Over one million IVF babies have been born worldwide, around 28,000 in the U.S.—roughly 1% of newborns. This may soon become the “natural” way once more procedures become available to design our own babies. We may recoil today at the thought of designer babies, but we also recoiled twenty-five years ago against the thought of test-tube babies.

Stock closes his book by saying, “We are beginning an extraordinary adventure that we cannot avoid, because, judging from our past, whether we like it or not this is the human destiny.”^{3} But is it?

What’s So Wrong With Tinkering With Our DNA?

Couples are already being given the power to choose the sex of their child, even at the cost of simply rejecting the embryos that are the wrong sex. But our technology is advancing rapidly to allow a far broader array of genetic choices.

Gene therapy, the ability to transfer a normal human gene into the affected tissues of a person affected by a single gene disease, has been pursued for over ten years. So far results have been disappointing. That is partly the reason why many are looking for improved ways to add genes to the earliest one cell stage embryo so the gene can be spread to all tissues at once. This process is also rather inefficient in animals, successful only about 1% of the time.

But this does not deter some because they already view the embryo, before fourteen days after conception, as little more than reproductive cells and not yet worthy of being declared human. If this definition holds, embryos can be wasted as long

as a supply of human eggs is readily available. In addition to preimplantation genetic diagnosis (PGD) for sex selection and selection of embryos that are free of cystic fibrosis, Tay Sachs, hemophilia, and other genetic diseases, other genetic technologies are on the near horizon.

Researchers have already devised artificial chromosomes. These chromosomes pass on stably over several generations in mice. They have been tested successfully in human tissue culture, and have remained stable over dozens of cell divisions. No one has added foreign genes to these chromosomes, but that is the plan: to provide a safe and effective means of adding genes to embryos and have them distributed to all tissues and to succeeding generations.

Genetic futurist Gregory Stock summed it up when he said, "Breakthroughs in the matrixlike arrays called DNA chips, which may soon read thirty thousand genes at a pop; in artificial chromosomes, which now divide as stably as their naturally occurring cousins; and in bioinformatics, the use of computer- driven methodologies to decipher our genomes—all are paving the way to human genetic engineering and the beginnings of human biological design."[\[4\]](#)

Some may scoff at these projections, but people seem quite willing around the world to consider taking advantage of technologies that can genetically enhance themselves or their offspring. "In a 1993 international poll, Daryl Mercer, director of the Eubois Ethics Institute in Japan, found that a substantial segment of the population of every country polled said they would use genetic engineering both to prevent disease and to improve the physical and mental capacities inherited by their children. The numbers ranged from 22 percent in Israel and 43 percent in the United States to 63 percent in India and 83 percent in Thailand."[\[5\]](#) So what's the problem?

What's Our Next Step?

I believe that being able to genetically redesign human beings is far closer than most people realize. Not only is the technology developing at an ever-increasing rate, but people are also far more willing to consider using such technologies than most would want to think.

I hope my tone in this article has indicated that I have deep reservations about this seemingly inevitable future. But why do I say this is inevitable? And why would I have reservations about taking this next step?

I believe that at least trying to alter ourselves genetically is inevitable because the technology is developing rapidly using animal models. And whatever we have done in animals, we eventually do in humans. The naturalistic worldview says quite strongly that we are just another animal species. If our understanding of our own genetics continues to increase and we gain the technology to correct our defects and faults, the naturalist says, Why not?!

Society and governments have put few barriers in the way of scientists and researchers from simply taking the next logical step. So far, we have been unwilling to say that there are some experiments we will not do. Even though most will say they are against human cloning—even scientists—that figure is changing, and we have few reasons for our objections besides the fact that it is not yet safe. If it does become safer, the public will have little room to say no. We've painted ourselves into a bit of a corner.

In regard to genetic engineering, we are easily swayed by appeals to eliminate genetic diseases without considering how difficult it is to delineate between curing genetic disease and producing genetic enhancements. James Watson, co-discoverer of the structure of DNA and Nobel Laureate, exposes our difficulty with two penetrating statements. Concerning

curing genetic disease he said, "What the public wants is not to be sick and if we help them not to be sick, they'll be on our side."[\[6\]](#) In another context Watson would have left most people dead in their tracks when he said, "No one really has the guts to say it, but if we could make better human beings by knowing how to add genes, why shouldn't we?"[\[7\]](#)

Leon Kass, chairman of President Bush's Council on Bioethics, put it quite succinctly when he said, "The first thing needful is a correction and deepening of our thinking."[\[8\]](#) When I speak to young people in particular, I almost plead with them to pay attention in biology class. These genetic choices will probably begin to be available to today's high school students as they marry and begin their families. They and we need to be better prepared.

How Will the Church Be Challenged?

There are just a few voices warning of the coming challenges and opportunities of the developing crisis over human dignity as the diesel engine of human genetic technology gains momentum and steam. Some fear it may already be beyond the point of no return and believe we'd better figure out how we are going to cope with our inevitable future of redesigned humans.

Leon Kass's book, *Life, Liberty, and the Defense of Dignity*, is a good place to start. Though not a Christian, Kass dances around the edges of a Christian or theistic worldview that at least acknowledges that there is a human design in place that we need to be mindful of before we head out at breakneck speed to change who and what we are.

Kass sees that our efforts to redesign humans challenge our very dignity and identity as human beings. If parents have constructed the best child for them using the best available technology they can afford, are they still parents, or creators and owners with additional rights and privileges? A

child becomes a commodity to be designed, manufactured, and even sold. Love and nurture will turn to management and stimulation.

Gregory Stock is the director of the Program on Medicine, Technology and Society at the UCLA School of Medicine. His book, *Redesigning Humans: Our Inevitable Genetic Future*, will sober you up quite quickly. Stock is a naturalist and has little patience with those who would hold back our genetic future. He is knowledgeable and unflinching about the possibilities. One commentator wrote; "This is the most important book ever written about what we could do to make better people. I could not put this book down because it challenged everything I knew about human nature." I would agree.

In my travels I have found the church to be largely unaware of how close we are to Stock's vision of redesigning humans. Within a few short decades our children will be pressured to alter their children genetically to keep up with society. Scientific research may well make use of human embryos as matter of fact research subjects. This may likely extend to developing fetuses, and it will all in the name of furthering health and eliminating disease.

How will we react? The Barna Research Group tells us over and over again that the Christian community does not think or act in an appreciatively different manner than society at large. That means these genetic technologies will find their way into the church. There will be a new source of discrimination to deal with. No longer will churches be segregated by economic status and race but by genetic pedigree as well.

Do we really think we can improve on or maybe at least recover the original design? There may be a new Tower of Babel on our horizon. We must take seriously this threat to our future, both of humanity and the church.

Notes

1. Gregory Stock, *Redesigning Humans: Our Inevitable Genetic Future* (New York: Houghton Mifflin, 2002).
2. Claudia Kalb, "Brave New Babies," *Newsweek*, 26 January, 2004, 45-53.
3. Stock, 197.
4. Ibid., 13.
5. Ibid., 58.
6. Quoted in Leon Kass, *Life, Liberty, and the Defense of Dignity: The Challenge of Bioethics* (San Francisco: Encounter Books, 2002), 7.
7. Quoted in Stock, 12.
8. Kass, 8.

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Into the Void: The Coming Transhuman Transformation

In the TV show *The Six Million Dollar Man*, Lee Majors played Steven Austin, a crippled astronaut who was rehabilitated through bionic technology that gave him superhuman strength and powers. The show, like so much science fiction, presents us with the dream that technology will enhance all our facilities from sight to memory, hearing to strength, and lengthen our life span to boot. The bionic man represents a fictional forerunner of the transhuman transformation. The Transhumanist school believes that technology will not only enhance the human condition, but eventually conquer death and grant us immortality. Human enhancement technology performs wonders in allowing the lame to walk, the blind to see, the deaf to hear and the sick to be well, but even immortality is

out of the reach of technology. In striving to enhance our physical existence we may lose our souls in the process.

In his famous book, *The Abolition of Man* published in the 1940s, C. S. Lewis wrote that modern society is one step away from “the void”[{1}](#)—“post-humanity,”[{2}](#) a state of existence from which there will be no return. Lewis argues that when we step outside of what he calls the Tao[{3}](#), we lose all sense of value for human life that has always governed civilization. What Lewis calls the Tao, we might call Natural Law or Traditional Morality—that internal moral understanding of right and wrong which God has written on the hearts of all people (Romans 2), the *Logos* by which all things were created (John 1, see especially verse 4).[{4}](#)

In leaving traditional spiritual values behind, Lewis argues, modern technological civilization has reduced human value to only what is natural, and we have lost our spiritual quality. Modern society has striven to conquer nature and largely succeeded, but at a great cost—with each new conquest, more losses in human dignity, more of the human spark extinguished. Lewis offers the example of eugenics from his time in the 1930’s and 40’s.[{5}](#) Eugenics is now a debunked science of racial manipulation and something we know was practiced with particular ferocity in Nazi Germany.[{6}](#) But the driving philosophy of manipulating nature and humanity into something new and final remains prominent. Lewis underestimated the truth of his own prophecy. He thought that maybe in 10,000 years the final leap will be taken when mankind will solidify itself into some kind of inert power structure dominated by science and technology.[{7}](#)

However, the 21st century may prove to be the era of posthumanity that Lewis foresaw in his time. The current movement of transhumanism, or human enhancement, asserts that humanity will eventually achieve a new form as a species through its adaption to modern computer technology and genetic engineering in order to reach a higher evolutionary condition.

Our present state is not final. Transhumanism derives from Darwinian doctrine regarding the evolution of our species. Evolutionary forces demand that a species adapt to its environment or become extinct. On this view, many species experience a pseudo-extinction in which their adaptation gives way to another kind of species leaving its old form behind. Many evolutionists believe this happened to the dinosaurs on their way to becoming modern birds and that humanity faces the same transformation on its way up a higher evolutionary path.[\[8\]](#) Primates evolved into humans so humans will eventually evolve into something higher (posthuman).

Metaman

Our present condition will give way to the cyborg (which is short for cybernetic organism) as we join our bodies and minds to technological progress. Transhumanists believe that because Artificial Intelligence (computing power) advances at such a rapid pace, it will eventually exceed human intelligence and humanity will need to employ genetic engineering to modify our bodies to keep pace or become extinct. Therefore, the cyborg condition represents humanity's inevitable destiny.

The two predominant pillars in transhumanism revolve around Artificial Intelligence (AI) and genetic engineering. One represents a biological change through manipulating genes. The other presents the merging of human intelligence with AI. The biological position (through use of genetic engineering) claims that through transference of genes between species, we eradicate the differences and create a global superorganism that encompasses both kinds of life—the natural and the artificial. Biophysicist Gregory Stock states that once humanity begins to tamper with its genetic code, and the codes of all other plants and animal species, that “the definition of ‘human’ begins to drift.”[\[9\]](#) Through genetic engineering we will transform the human condition by merging humanity with the rest of nature, thereby creating a planetary

superorganism. A superorganism operates like a bee hive or an anthill as a collection of individual organisms united as a living creature. Stock calls this Metaman, the joining of all biological creatures with machines, making one giant planetary life form. This superorganism encompasses the entire globe.

Transhumanism presupposes that no distinction exists between humanity, nature or machines. Metaman includes humanity, all it creates, and also the natural world. It acknowledges humanity's key role in the creation of farms and cities, but includes all natural elements, such as forests, jungles and weather. Metaman includes humanity and goes beyond it.[{10}](#) Stock envisions a greater role for genetic engineering in redefining biological life as different species are crossed. Humanity may now control the direction of its evolution and that of the entire planet.

Stock states that through "conscious design" humanity has replaced the evolutionary process.[{11}](#) This leads us to Post-Darwinism where people have supplanted the natural order with their own technological modification of humanity and the entire ecological system. "Life, having evolved a being that internalizes the process of natural selection, has finally transcended that process."[{12}](#) Humanity may now, through the agency of technological progress, seize direction of its development and guide it to wherever it wants itself to go. No other species has ever controlled its own destiny as we do.

The Singularity

A second transhumanist belief argues for the arrival of an eventual technological threshold that will be reached through the advancement of Artificial Intelligence. The argument goes like this: because AI develops at a rapid pace it will achieve equality with the human brain and eventually surpass it. Estimates as to when this will happen range from the 2020's to 2045. The evolutionary process will reach a crescendo sometime in the 21st century in an event transhumanists call "the

Singularity.”{13} There will be a sudden transformation of consciousness and loss of all distinction, or Singularity, between humanity and its creations, or the absence of boundaries between the natural and artificial world. Singularity watchers expect that this event will mark the ultimate merging of humans and machines. Renowned inventor and AI prophet Ray Kurzweil states, “The Singularity will allow us to transcend these limitations of our biological bodies and brains. . . . There will be no distinction, post-Singularity, between human and machine. . . .”{14}As the fictional CEO and mastermind behind a cutting edge AI company in the year 2088 crowed, “My goal is for us to end death as we know it on earth within 50 years—for the essence of every person to live perpetually in an uploaded state. . . . The transhuman age has dawned.”{15}

Both of these positions, one emanating from genetic engineering that seeks to enhance the body, the other from Artificial Intelligence that seeks to supersede and even supplant the need for bodies, argue for the eventual replacement of humanity with biological-machine hybrids. Metaman and Singularity systems are direct heirs of the modern idea of progress. They present the dawning of a technological Millennium, but they also share a long history dating back into medieval Christendom. In the early Church, technology, or the “mechanical arts,” was never considered as a means to salvation or Edenic restoration. Historian David Noble argues that from Charlemagne to the early Early Modern period technology became associated with transcendence as the means of restoring the lost divine image or *imago dei*.{16}

Theologian Ernst Benz argues similarly that the Modern technological project was founded on a theological notion in which humanity believed itself to be the fellow worker with God in establishing His kingdom on earth through reversing the effects of the Fall.{17} We are fellow workers with God; however, this position overemphasized humanity’s role in

restoration to the point of becoming a works-based salvation of creation.

Despite the apparent secularity of the super science behind all the technological wonders of our time, the notions of modern progress and transhumanism remain grounded in an aberrant form of Christian theology. Noble summarizes this well when he states, “For modern technology and modern faith are neither complements nor opposites, nor do they represent succeeding stages of human development. They are merged, and always have been, the technological enterprise being, at the same time, an essentially religious endeavor.”^{18} The theology behind Modern technological progress remains rooted in Medieval and Early Modern notions of earthly redemption when the “useful arts,”^{19} which ranged anywhere from improved agricultural methods to windmills, were invested with redemptive qualities and humanity began to assume an elevated status over nature. “In theological terms, this exalted stance vis-à-vis nature represented a forceful reassertion of an early core Christian belief in the possibility of mankind’s recovery of its original God-likeness, the ‘image-likeness of man to God’ from Genesis (1:26), which had been impaired by sin and forfeited with the Fall.”^{20} Technology becomes the means of restoring the original divine image. Technological development was expected to reverse the effects of the Fall and restore original perfection. This theology also serves as the impetus behind Millennial thought which believes technology helps humanity recover from the Fall and leads to an earthly paradise. Transhumanism extends this Millennial belief into the twenty-first century.

Redeeming Technology

We are faced with the problem of how to redeem all the advances of technology such as human enhancement without losing ourselves in the process. Idolatry preoccupies our central concern with technology. Biblically speaking, idolatry

exalts the work of humanity, including individual human beings, over God; we commit idolatry when we serve the creature rather than the Creator. "Professing to be wise, [we] became fools, and exchanged the glory of the incorruptible God for an image in the form of corruptible man and of birds and four-footed animals and crawling creatures" (Rom. 1:22-23). Theologian Paul Tillich offers a keen and insightful definition of idolatry when he states, "Idolatry is the elevation of a preliminary concern to ultimacy. Something essentially partial is boosted into universality, and something essentially finite is given infinite existence."[\[21\]](#) Transhumanism presents us with a spiritualization of technology believed to grant us immortality through shedding our bodies and adopting machine ones or through genetic engineering that will prolong bodily life indefinitely. Our Modern age defines technology as a source of material redemption by placing finite technical means into a divine position, thus committing idolatry.

In seeking to reconcile technology with a biblical theology we have three possible approaches. *Technophobia* represents the first position. This view contends that we should fear technological innovation and attempt to destroy it. The Unabomber Manifesto offers the most radical, pessimistic and violent expression of this position, arguing for a violent attack against the elites of technological civilization such as computer scientists in an effort to return society to primitive and natural conditions in hopes of escaping the kind of future transhumanists expect.[\[22\]](#) However, the entire tenor of our times moves in the opposite direction, that of *technophilism*, or the inordinate love for technology. Transhumanism optimistically believes that through technological innovation we will restore our God-like image. A third position asserts a mediating role between over-zealous optimism and radical morose pessimism. [\[23\]](#)

Technocriticism

Technocriticism offers the only viable theological position. By understanding technology as a modern form of idolatry we are able to place it in a proper perspective. Technocriticism does not accept the advances of innovation and all the benefits new technology offers without critical dialogue and reflection. Technocriticism warns us that with every new invention a price must be paid. Progress is not free. With the invention of the automobile came air pollution, traffic and accidents. Computers make data more accessible, but we also suffer from information overload and a free-flow of harmful material. Cell phones enhance communication, but also operate as an electric leash, making inaccessibility virtually impossible. Examples of the negative effects of any technology can be multiplied if we cared enough to think through all the implications of progress. Technocriticism does not allow us the luxury of remaining blissfully unaware of the possible negative consequences and limitations of new inventions. This approach is essential because it demonstrates the fallibility of all technological progress and removes its divine status.

Technocriticism humanizes technology. We assert nothing more than the idea that technology expresses human nature. Technology is us! Technology suffers the same faults and failures that plague human nature. Technology is not a means of restoring our lost divine image or reasserting our rightful place over nature. This amounts to a works-based salvation and leads to dangerous utopian and millennial delusions that amount to one group imposing its grandiose vision of the perfect society on the rest. Such ideologies include Marxism, Technological Utopianism and now Transhumanism. We are restored to the divine “image of His Son” by grace through faith alone (Rom. 8:29). Technology, serving as an extension of ourselves, means that what we create will bear our likeness, both as the image-bearers of God and in sinful human identity. It contains both positive and negative consequences

that only patient wisdom can sort through.

Through criticism we limit the hold technology has on our minds and free ourselves from its demands. We use technology but do not ascribe salvific powers of redemption to it. A critical approach becomes even more crucial the further we advance in the fields of genetic engineering and AI. We do not know where these fields will lead and an uncritical approach that accepts them simply because it is possible to do so appears dangerous. We live under the delusion that technology frees us, but as Lewis warns, "At the moment, then, of Man's victory over Nature, we find the whole human race subjected to some individual men, and those individuals subjected to that in themselves which is purely 'natural'—to their irrational impulses." [\[24\]](#) The famous science-fiction writer Frank Herbert echoes Lewis's sentiments in his epic novel *Dune*: "Once men turned their thinking over to machines in the hope that this would set them free. But that only permitted other men with machines to enslave them." [\[25\]](#) Genetic engineering or merging humanity with AI only exchanges one condition for another. We will not reach the glorified condition transhumanists anticipate. A responsible critical approach will ask, Into whose image are we transforming?

Notes

1. C. S. Lewis, *The Abolition of Man* (New York: Macmillan, 1947), 77.
2. Ibid., 86.
3. Lewis, of course, did not originate this ancient Chinese concept but rather applied it to universally accessible principles.
4. Ibid., 56.
5. Ibid., 72
6. See [Darwin's Racists: Yesterday, Today and Tomorrow](#) by Sharon Sebastian and Raymond G. Bohlin, Ph.D. Though the German Nazis acted out this hideous ideology to an extreme, eugenics was actually first promulgated in the United States,

Germany and Scandinavia around the turn of the 20th Century.

7. Lewis, *The Abolition of Man*, 71.

8. See Dr. Ray Bohlin's article [PBS Evolution Series](#), especially the section entitled "'Great Transformations' and 'Extinction'."

9. Gregory Stock, *Metaman: The Merging of Humans and Machines into a Global Superorganism* (New York: Simon and Schuster, 1993), 165.

10. Ibid., 20.

11. Ibid., 228.

12. Ibid., 231.

13. Ray Kurzweil, *The Singularity is Near* (New York: Penguin, 2005).

14. Ibid., 9.

15. David Gregory, *The Last Christian*, (Colorado Springs: Waterbrook Press, 2010), 102.

16. David F. Noble, *The Religion of Technology* (New York: Knopf, 1997), 9.

17. Ernst Benz, *Evolution and Christian Hope: Man's Concept of the Future from Early Fathers to Teilhard de Chardin* trans., Heinz G. Frank (New York: Doubleday, 1966), 124-125.

18. Noble, *The Religion of Technology*, 4, 5.

19. Ibid., 14.

20. Ibid.

21. Paul Tillich, *Systematic Theology: Reason and Revelation Being and God*, Vol. 1 (Chicago: University of Chicago Press, 1951), 13.

22. FC, *The Unabomber Manifesto: Industrial Society and Its Future* (Berkeley, CA: Jolly Roger Press, 1995).

23. See Neil Postman, *Technopoly: The Surrender of Culture to Technology* (New York: Knopf, 1992), 5.

24. Lewis, *The Abolition of Man*, 79, 80.

25. Frank Herbert, *Dune* (New York: Ace, 1965), 11.