NANOETHICS

THE ETHICAL AND SOCIAL IMPLICATIONS OF NANOTECHNOLOGY

EDITED BY

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ARE WE PLAYING GOD WITH NANOENHANCEMENT?

Ted Peters

Is nanoenhancement playing God? Is any form of human enhancement playing God? By "playing God," we mean manipulating the intricacies of human nature so that human nature becomes something other than what it is. We mean changing nature. And, if we change nature without permission, will we violate something sacred? Will nature strike back in vengeance and punish us? In order to avoid reprisal, should we avoid progress in nanotechnology?

The question of whether or not we should play God with human nature became the central ethical question during the Human Genome Project of the 1990s. This ethical question is being asked once again in our era of nanotechnology. Nanotechnology deals with the manipulation of matter at the level of atoms and molecules. Futurists project that nanotechnology combined with genetic advances could lead to dramatic breakthroughs in medical therapy and, of course, in enhancing human capabilities. Chief on the list of human enhancements is neurocognitive augmentation and intelligence expansion.

Nanoethics constitutes a form of analysis, assessment, evaluation, and recommendation regarding alternative scenarios which nanotechnology developments might follow. In this chapter we will look briefly at intelligence enhancement, identify scenarios with ethical valences, and then raise the question: Are nanotechnology innovators playing God?

We will show that the concept of playing God derives from the ancient Greek myth of Prometheus. The myth lives on in modern culture disguised as the figure

of Frankenstein. Today, we fear a Frankenstein scientist might violate nature through technological intervention and this will let loose the powers of chaos and destruction. In contrast, an ethical vision grounded in Christian theology does not operate out of this fear of violating nature. Rather, a biblically based theology affirms change and transformation rather than trying to retard scientific and technological advance. The Christian approach to ethics orients itself toward loving God and loving neighbor. The ethical question here would be: How can nanotechnology enhance the human capacity for loving God and neighbor?

WOULD WE CHANGE THE NATURE OF OUR HUMAN NATURE?

When we extrapolate present trends to project future scenarios, some nanotechnology futurists anticipate changes in human functioning so radical that we must ask the question: Will we alter human nature so that something posthuman or transhuman will result? If today's human beings are capable of giving technological birth to a new and superior species, is it ethical to pursue this? Would such a goal violate something intrinsically valuable or even sacred lying within our biologically inherited natural state? Does nanotechnology put human identity at risk?[1]

What about using nanotechnology to make ourselves smarter? Let us look briefly at what is being projected for human intelligence augmentation, most frequently referred to as neurocognitive enhancement. Sometimes it is named "intelligence amplification" (IA) or "cognitive augmentation" and even "machine-augmented intelligence." We are projecting the possible use of information technology and even genetic technology to augment or expand the range of human intelligence. What the next decades could bring is a new advance in the cybernetic revolution already begun in the 1950s and 1960s. Here is a scenario put forth by the Enhancement Technologies Group (ETG, 2006) that wants to increase the capability of a person to approach a complex problem and solve it: "Increased capability in this respect is taken to mean a mixture of the following: more-rapid comprehension, better comprehension, the possibility of gaining a useful degree of comprehension in a situation that previously was too complex, speedier solutions, better solutions, and the possibility of finding solutions to problems that before seemed insolvable."

Is this sufficiently radical to be considered a change in human nature? No. Yet, still more dramatic changes can be projected. Suppose smaller incremental enhancements are introduced but then amplified and reamplified until they grow exponentially? These new levels of intelligence could transfer themselves to accelerated computing platforms, such as optical nanocomputers or quantum nanocomputers. This would allow them to accelerate the brain's thinking speed significantly. Futurists have called the possibility of such an event the "Singularity." The idea of this singularity implies an impact upon our world that could "exceed that of any other foreseeable technological advance," says the Accelerating Futures group. "A Singularity, if successful, would create a massive upward spike in the quantity of intelligence here on Earth, a persistent positive-feedback process, continuously enhancing itself. In a favorable scenario, our freedom and potential could

be maximized, opening up astonishing new possibilities that might have taken trillions of years for unaided humans to create alone." (Accelerating Future, 2006) Might this scenario count as an alteration of our human nature? Well, we are getting closer.

One of the assumptions frequently made in the contemporary neurosciences is that our minds or even our souls are reducible to the physical operations of our brains. Eugene d'Aquili and Andrew Newberg (1999, p. 75), for example, write: "In our model, the mind and the brain are essentially two different ways of looking at the same thing, the brain representing the structural aspects of the mind, and the mind representing the functional aspects of the brain. They each affect the other and are affected by the other in the rhythmic process of the empiric modification cycle." As long as this assumption holds and nanotechnology or nanobiotechnology enhances the brain, which in turn enhances the mind, we will not be able to say that human nature has been altered. Our identities will remain stable. Who we presently are will simply enjoy physical and mental enhancement.

If we operate with the assumption that brains and minds and hence souls are virtually isomorphic—" brains" and "minds" are different ways of looking at the same thing—then this implies that any form of mind enhancement will necessarily take the form of brain enhancement. To get to our mind, we must go through the body.

However, if we make a different assumption, then the scenario looks different. Suppose we assume that a person's mind or even soul consists of an information pattern or package. Suppose we assume that our mind is like software and our body is like hardware. Could the software be transferred to different hardware? Could we move our mind from our body into a computer? If this information pattern could be comprehensively removed from our physical body and placed in a computer, then the computer rather than our brain would be in a position to enhance us.

If we transfer our mind to a computer and if we keep backing it up, might we attain cybernetic immortality? Ray Kurzweil (1999, Chapter 6) says yes. In the past, he says, our mortality has been tied to the longevity of our bodies, to our hardware. So, when our bodies die, our hardware crashes, and our mental processes crash with it. When we instantiate ourselves in our computational technology, our software and hence our immortality will no longer be dependent on the survival of our physical brain. Our immortality will be contingent on our being careful to make frequent backups.[2] Would a disembodied mind located in a mechanical device such as a computer count as a change in human nature?

While we are on the subject of immortality, I might say in passing that what is proposed here has nothing to do with what Christian theology means by salvation. What Christians affirm is resurrection of the whole person—body, soul, spirit, communal relations—concomitant with God's renewal of the creation, the advent of the new creation. What Christian theologians reject is the idea that the soul—here in the form of the mind—extricated from the body constitutes salvation. Munich theologian Wolfhart Pannenberg (1991–1998, p. 572) writes, "The soul is not on its own the true person as though the body were simply a burdensome appendage or a prison to which the soul is tied so long as it has its being on earth. Instead, the person is a unity of body and soul, so that we can think of a future after death only as bodily renewal as well."

In short, a plan to extricate the human mind from the human body—what we might call a *soulechtomy*—assumes substance dualism; it assumes that the body and mind or soul are separate substances or separate realities. It assumes that who we are in essence is determined primarily if not exclusively by our mind and not our body. This is a highly questionable assumption in our era when many in both philosophy and theology affirm holism—that is, the integration of body, soul, and spirit. Nevertheless, some in the field of cybernetic technology will proceed with experiments based upon this dualistic assumption. The results may be quite interesting.

Just how interesting? Despite the observation that cybernetic immortality would have no impact on the Christian concept of resurrection, it would still be a marvelous—though not obviously advantageous—achievement. Perhaps disembodied consciousness will turn out to be impossible. Even short of disembodied consciousness, however, some alterations being projected by nanotechies could result in significant changes in how we human beings might live. How should we embrace such changes? Bioethicist Paul Wolpe (2002, p. 164) cautiously welcomes even the most radical changes: "We really are becoming some kind of cyborg, some kind of posthuman in the sense that for the first time in history we really are going to incorporate our synthetic technologies into the very physiology of our being—with major, though not necessarily entirely undesirable, consequences."

RELATIONAL INTELLIGENCE

We have just looked at two scenarios: one based on the assumption that minds are exhaustively dependent on brains and one based on the assumption that minds can be separated from brains. Now, let us take a look at a third assumption: Minds are inextricably embodied and our intelligence necessarily includes a relational component. What kind of scenario results from this assumption?

Theologian and computer scientist Noreen Herzfeld (2002) makes this third assumption. She says we should view intelligence as something more than merely the physical processes of the brain, yet it is inextricably tied to brain and even whole-body function. Mind is more than merely genetic and neuronal activity. Intelligence is a relational phenomenon.

Herzfeld uses the Turing test as an illustrative example. In order to answer the question, "can computers think?" British mathematician Alan Turing provided the now widely accepted answer, namely, simply ask them. Because it is impossible to observe thought processes in someone other than ourselves, we ascertain that he or she is intelligent through interaction, usually conversation. To date no computer built is intelligent. When a computer becomes intelligent, we will know it when we interact with it intelligently: "If we accept the Turing Test ... as the ultimate arbiter of intelligence, then we have defined intelligence relationally" (Herzfeld, 2002, p. 46) As a theologian, Herzfeld (p. 87) proceeds to affirm "a relational understanding of the *imago Dei*, one that sees the image of God as emergent only when and insofar as we are in relationship with God and with others"

Gregory Peterson (2003) would agree with Herzfeld: "We are not simply disembodied reasoning machines but persons in a bodily and communal context," he writes

(p. 218). This implies that simple nanoaugmentation of brain function may enhance a limited portion of the thought process of an individual, but it is not likely in itself to produce an advance in intelligence. The ethical implication is that we must take into account the relational dimension of human persons if we are to enhance the intelligence of human persons. Peterson by no means calls us to stop playing God; he only opens us to pursue possibilities with relational responsibility in mind (p. 219): "A truly Christian view of the future is not simply individualistic but communal, and it is difficult to see how such technologies will be used both fairly and equitably. At the same time, it is important to keep in mind how open the future is."

If we wish to answer a question asked earlier regarding the degree of identity change that would result from cybernetic immortality, perhaps the Turing test—now a relationality test—might be employed profitably. Suppose we take the information pattern that constitutes the mind of a person we know as Patrick. Suppose we remove it from his body and dispose of his body. Then we place his mind like software into a computer and boot it. Our question would be: Have we changed the nature—the essential nature or identity—of Patrick? To find out, we would step up to the computer and ask, "Patrick, is that you?"

On the one hand, we might receive no answer at all or a quizzical "no." We would then conclude that Patrick's essential nature had been altered and his identity lost. We might regret having tried to play God. On the other hand, the computer might answer back, "Yes, it's me. Patrick!" We would then ask, "Howya doin?"

If Patrick answers "fine" and proceeds to converse with us intelligently, recalling his past personal history, looking forward gleefully at his future adventures in his disembodied state, then we might conclude, "yes, it is Patrick." We will not have changed his essential nature. Rather, this technology will have extended into the future a nature that had previously been inherited.

When searching for an essential human nature in an antiessentialist postmodern culture that denies such a thing, philosophical theologian Robert Cummings Neville (1997) offers a relational definition. It includes the sense of obligation to those with whom one is in relation and it includes continuity of history: "The normative identity of each one of us is partly defined by what is normative for the communities of human beings in historical connection. . . . The closest thing to an essence of human nature is having the obligation to take responsibility for being part of the history in which we ourselves are engaged." If we apply the Neville criterion, then Patrick will be Patrick even if his mind carries out social obligations from within a computer.

Such future projections lead to a number of questions. Will the changes envisioned here lead to the emergence of a new species, a transhuman or a posthuman being? If nanotechnology and nanobiotechnology are capable of producing a change so radical that human nature might undergo modification or alteration, would this violate a commandment such as: Thou shalt not play God? These are questions for nanoethicists to ask.

NANOETHICS

Nanotechnology along with bionanotechnology belong squarely within the field of futurology, the study of the future concomitant with unavoidable ethical deliberation.

Techno futurists operate according to what I call the *understanding–decision–control* (u-d-c) formula. The first task is to understand the direction current trends are taking us. In this case, we need to project the possible future scenarios nanoresearch will bring about. Such understanding includes distinguishing between desirable and undesirable futures, and this is where ethical deliberation helps us distinguish what we should pursue and what we should avoid. The second task is decision—that is, we make the decision now to pursue the technological scenario most likely leading to the desirable future. The third task is to take control of what is projected to happen in order to aid and abet a positive future becoming actualized.[3] Now, we know from experience what a will-o-the-wisp the desire for control can be, yet control is an objective in futuristic thinking.

Ethical deliberation belongs at stage one, envisioning a better future and setting the moral criteria for determining what counts as a better future. Nanospeculation is rife with wild-eyed and enticing scenarios for medical therapy and human enhancement. So we need to ask: What counts ethically as we compare various scenarios? The field of nanoethics today is shouldering moral responsibility for what should happen tomorrow. (Lin and Allhoff, 2006).

How should the ethical issue be formulated? It might appear that the ethical issue is this: Just how much change can we morally allow? Are we morally obligated to protect our inherited human nature? Such a formulation of the moral challenge is theologically misleading, however. What concerns the theologian is this: How can we envision a future with enhanced inclination to love God and love our neighbor? Unfortunately, the question of whether or not we should play God obscures this central concern. Let us pose the question of playing God and see where it leads us.

SHOULD WE PLAY GOD WITH OUR BRAINS?

This question may seem to have a double meaning. First, it asks whether we should physically modify our brains. Second, it asks whether we should employ our brains in deciding whether or not to play God. Perhaps it implies that only one without brains would play God. Be that as it may, it is the first of these meanings that will occupy us here.

What does the phrase "play God" mean? In recent decades it has come to refer to three things. First, to play God is to *learn God's awesome secrets*. When scientists study the inner workings of nature, especially the inner workings of living things, previous mysteries become revealed. What was dark and secretive now comes to light. If the natural world is God's creation and if God's mind is written into the blueprint of this creation, then scientists are gaining the ability to read the divine mind. This could be inspiring. Or, it could be frightening. For the most part, we presume that it is inspiring. No inhibition or restriction on the pursuits of science follows from this first understanding of playing God.

The second meaning is associated with the *power of life and death*. The context for this meaning of "playing God" is the clinic or hospital. It refers to the skill and training and dedication of the doctor or surgeon in whose hands your or my life has been placed. When feeling helpless due to disease or infirmity, the physician appears to us as "godlike"

in power. Nurses may joke that the doctors' lounge is "where the gods dwell," but no one would prohibit physicians from employing their godlike powers to save human life.

Sometimes medical doctors are criticized for their pride, their hubris for thinking they know more than they do. This brings us to the third meaning of the phrase playing God. It is associated more with medical researchers than clinical physicians. To play God is to *alter life and influence human evolution*. Our society and our culture is ridden with fear that laboratory scientists will be so overfilled with pride—with *hubris*—that they may create new life forms that will violate something sacred in nature and cause a backlash in the form of uncontrollable disease or related calamity. The only way to prevent such a calamity is to restrain medical researchers, to cut their pride off at the knees, and prevent them from making fatal mistakes that could endanger all of us.

To play God is to make the mistake made by the mythical figure Prometheus. Prometheus, recall, stole fire from the sun to bring heat and light to the damp and dark earth. The god Zeus, the sky god who claimed provenance over the sun, felt violated by Prometheus' intrusion into the divine realm where he did not belong. So, Zeus punished Prometheus severely, chaining the Titan to a rock where an eagle could daily eat his liver. The repeated telling of this Greek myth carries a message: Do not let human pride or hubris so inflate your confidence in what you believe you can accomplish in the future that you anger the gods. In our modern world, no longer do we believe in the Greek gods. Yet, nature has replaced those Olympian gods. It is now nature who plays the role of Zeus. If our promethean scientists violate nature, we fear, then we may all suffer the consequences of nature's revenge.

The ancient myth of Prometheus lives on in our culture. Scientists like Frankenstein have replaced Prometheus, and nature has replaced the Olympian gods. Yet, the plot is the same. In the Frankenstein legends, the mad scientist oversteps the boundary between death and life. The result is the creation of a monster of chaos, who wreaks havoc and death on the community. In the novel and movie *Jurassic Park*, the mad geneticist oversteps the boundary of DNA and lets loose the monsters of chaos in the form of man-eating dinosaurs. These plots tantalize modern audiences because they twang a string deep within our cultural soul, the myth of Prometheus (Peters, 2003, pp. 9–15).

This is a pagan myth. It is not a biblical myth. Even so, the wisdom is not lost on the Bible. The story of the Tower of Babel in Genesis 11 makes a similar point: When we try to storm the gates of heaven by human artifice, we are destined for a big fall. "Pride goes before destruction" (Proverbs 16:18). Having said this, however, it is important to recognize that the phrase "playing God" as used today derives from the resilience of the Promethean myth within western culture, not from Jewish or Christian theology.

The force this myth exerts is to stimulate fear of scientific and technological progress, even to the point of prohibiting some forms of laboratory research. What fits here is the widespread general criticism of nanoenhancement—a criticism which is also voiced by some of its supporters—that enhancement is or will often be practiced with a reckless and selfish short-term perspective that is ignorant of the long-term consequences on individuals and the rest of society. This implies that the hubris of the scientists will blind them to long-term consequences, leading to foolish laboratory recklessness. Those who say we should not play God want to prevent this from happening by erecting a no-trespassing sign on human nature as we know it.

As I have said, this modern myth has replaced the ancient Greek gods with nature, especially human nature. To understand just what playing God could mean in light of projections of nano- or nanobioenhancement, we need to ask whether or not the human nature we have inherited is sacred or unchangeable. On the one hand, if for moral reasons our nature ought not to be changed, then we should put up a no-trespassing sign on our genetic code and brain physiology to keep scientific researchers out. On the other hand, if we observe that human nature is changing naturally, and if we think such a thing as transformation can be a good, then we might look forward to nanotechnology changes as a form of human improvement and an advance toward human well-being.

How should we formulate the ethical issue posed by the transforming potential of nanotechnology and related fields? Should we pose the issue this way: Just how far can we go with our technology before we become guilty of playing God? No. I do not believe this is an illuminating way to pose the ethical issue. Rather, we should ask: How can nanotechnology as well as every other technology enhance our sensitivity and ability to love God and neighbor.

PLAYING GOD WITH HUMAN NATURE

On what grounds should we hold up an ethical vision of loving God and neighbor? Does nature itself tell us such love is what we should value? No. A moral code drawn from naturalistic ethics is not likely to teach us to love. Nature is not likely to teach us that, in order to love, we may need to overcome the limits of nature. An ethics based upon love might lead us to transform what we have inherited in light of a vision of something better. Our high regard for loving comes from theological reflection on God's love, not from nature.

We have noted that the myth of Prometheus or Frankenstein does not derive from theology, either Jewish or Christian theology. At the heart of this myth in its modern form is reverence for nature. Nature, not God, appears to provide the grounding for what is sacred, whether the sacred is given religious labels or not. The commandment against playing God is grounded in a tacit or overt commitment to naturalistic ethics.

The various schools of *naturalistic ethics* theorize that we can reduce all moral concepts to concepts of natural science, usually biology. What is good for the human person or the human race can be reduced to what is "desired" or "satisfying" or "right." (Ewing, 1967, pp. 415–417). Frequently, naturalistic ethicists simply assume that the human nature we have inherited from our long evolutionary ancestry has established what is good for us. The corollary is this: We should not change ourselves any further. What nature has blessed us with is good enough; in fact, it has established what is good for us.

Nature in this case picks up equivocal meaning. On the one hand, nature is what is natural over against what is technological. Nature is what we discover before we alter it through science and technology. On the other hand, nature defines our essence. This natural essence picks up semireligious valence as something almost sacred, inviolable. When the two different meanings are combined, then technological intervention looks like a violation of the sacred. Technology becomes a way of playing God, which is a sin in the eyes of naturalistic ethics.

How do we know what human nature is? How might we know when we have changed it or violated it? The answer most frequently offered is this: intuition. We intuit what is natural. Now, this intuited knowledge could be either rational or emotional. Thomas Aquinas claims it is rational. He said we intuit natural law with our reason through *synderesis*, "the law of our intellect" (*Summa Theologica*, II.i.Q.94, Art. 1). Leon Kass (2002), former chair of President George W. Bush's Council on Bioethics, on the other hand, bypasses reason and goes straight to the emotions, to repugnance (p. 150): "Repugnance is the emotional expression of deep wisdom, beyond reason's power completely to articulate it." What the emotion of repugnance tells us, Kass states, is that we have a nature that is about to be violated by biotechnological alteration. This violation of nature is due to human pride, to hubris, to Prometheus playing God. What we learn from the feeling of repugnance is that genetic technologies such as cloning constitute "the Frankensteinian hubris to create a human life and increasingly to control its destiny: men playing at being God" (Kass, 2002, p. 149).

Whether we appeal to reason or to emotion to discern what nature teaches us, we can learn only what has been the case. We can learn only what we have inherited from the past, from the history of nature. What nature cannot provide is a vision of the transformation of nature, a vision of a future characterized by love. To envision transformation, we must be invited to move toward the future by a transcendent lure. For Christian theologians, the transcendent lure is the love of God imagined as the peaceable kingdom (Isaiah 11) or the city of God (Revelation 24–25) where every creature lives in harmony.

The problem with naturalistic ethics is that, on its own, it cannot justify a vision of the end toward which we should orient our technological development. Nature cannot produce its own ethical vision, its own criterion of what is good. A *description of what is* the case in nature cannot become a *prescription of what ought to be*. What we have learned scientifically about human nature can establish neither a fence against change nor a vision of what the good is that will orient our plan to change. "The criteria for an agent acting for the good cannot come simply from consideration of animal behaviour," writes Celia E. Deane-Drummond (2004). No amount of intuition—either rational or emotional—is sufficient to provide a guiding principle for the human good.

THE ORIENTING GOOD

Philosophers Plato and Aristotle accompanied by theologians Augustine and Thomas Aquinas view *the good* as an end to be pursued, not as a present possession. The good is that for which we aim. It is not something we have inherited. Further, the good toward which we aim transcends who we are as human beings. The good centers in our relationship with God (the God of Israel, not Zeus). Once our relationship with God is secure and profound, then other lesser or mundane goods find their proper orientation and can be appreciated for what they are. Ethics when pursued by Christian theologians begins with our relationship to God and then expands on Jesus' commandment to love God and love neighbor.

The goods toward which nanotechnology and nanobiotechnology are aimed belong in the category of lesser values, proffered by visions that leave God out of the picture.

Yes, indeed, visions of improved neurocognitive abilities are enticing. In themselves, they draw us toward improved human well-being. Yet, it must be observed, none of the nanotechnology scenarios to date have oriented themselves around a vision of our relationship to God or the aim of enhancing our ability to love our neighbor. We even notice that some nanotechnology scenarios assume that the individual person and individual intelligence can be considered apart from relationships with those whom we are obligated to love.

Note what is being said here. We are not basing these ethical deliberations on the naturalist's commandment to avoid playing God. Theologically speaking, the issue is not whether or not we have an inherited human nature that needs to be protected from change. We do not need to protect a mythological human essence. We do not need to fear the advance of scientific research. Rather, what is at stake ethically for the theologian is whether or not a given technology will respond to a transcendent ground for goodness and will enhance our capacity to love.

The Christian faith is not averse to change. In fact, the Christian faith looks forward to transformation. The God of the Bible is a transforming God, one who does new things: "I am about to do a new thing" (NRS Isaiah 43:19). This makes Christian theology quite compatible with envisioned transformations through science and technology. Ian G. Barbour (2002) puts it in terms of continued evolution (p. 70): "Our future is a continuation of evolutionary history and also a continuation of God's project, in which human beings now have a crucial role because of the new powers acquired through science and technology."

Relevant here is the school of *eschatological ethics* within Christian theology. Based upon Jesus' promise of a coming kingdom of God and the New Testament vision of a future new creation, an eschatological orientation toward ethics celebrates transformatory change while trying to guide such change toward wholesome and loving ends. Beyond the "gosh" and "gee whiz" glee of technological advance, the ethicist seeks the betterment of humankind (Gardner, 1986, p. 204): "A social ethic based upon the NT must be built first of all upon the eschatological promise of the coming kingdom rather than on creation or preservation. The relationship of the coming kingdom to creation is dialectical and to a certain extent transformationist"

The future of nanoethics from the point of view of the Christian theologian will ask the question: Can nanotechnology or nanobiotechnology enhance our ability to love God and love our neighbor?

NOTES

1. It is difficult scientifically to posit something like an essential human nature. To believe in "an ideal human type ... makes little sense," says Robert Pollack of Columbia University. It flies "in the face of the first tenet of natural selection, that the survival of a species over the long term will depend above all on the existence of a maximum of variation from individual to individual" (Pollack, 2006, p. 8)

2. The cybernetic immortality described here has nothing whatsoever to do with what Christians understand as "resurrection of the body." What Christians look forward

to (1 Corinthians 15:42–44) is a new creation that includes resurrection of the body in a spiritualized form. It also includes healing. Those who advocate cybernetic immortality assume substance dualism—the split between body and soul—and then seek immortality for the soul (or mind) apart from the body. Christian eschatology is holistic, including body, soul, and spirit.

3. My original analysis of future consciousness in terms of understanding—decision–control was worked out in *Futures—Human and Divine* (Louisville, KY: Westminster John Knox Press, 1978) and *Fear, Faith, and the Future* (Minneapolis, MN: Augsburg Press, 1980).

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