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Editorial

HUMAN BEING: QUESTIONING AND BEING QUESTIONED

"What are human beings that you are mindful of them, mortals that you care for them?" (Psalm 8:4) The Hebrew poet asked this question more than 2,500 years ago, and it is as pressing a question today as it was then. What does it mean to be human? What ought humans to be doing? What is their role, or what are they for?

These are not only questions that we ask but that also are asked of us. We are in a sense called into question. In their mute and yet dramatic way, our fellow citizens in the commonwealth of the natural world—plants and animals—ask us the question. We are questioning creatures, and we are creatures who ourselves are always being questioned.

This reflexive nature—questioning and being questioned—arises wherever we see the interplay of science and the basic issues of life. The primary reason the evolutionary sciences are so much discussed in our culture, for example, and so hotly debated in some circles, is that evolution not only provides answers to some of our basic questions, it also puts questions: Who are we? Where do we fit in? The journey of the questioner may be difficult, but it is also a courageous, invigorating venture. Being ourselves called into question is a more threatening challenge.

As we complete thirty-nine years of *Zygon*'s publication in this issue, we offer articles that deal with this questioning and being questioned. Geologist George Fisher starts us off by dealing with the question Where do we fit in? He describes our spatial and temporal placement in the cosmos and the mandate that flows from this placement: "Thinking of Earth as sacred is not enough. We must also *feel* its sacredness deep in our souls."

Fisher closes his piece with the reminder that our action must be consistent with this sense of Earth's sacredness. Thus, we move directly into the Symposium on the Created Co-Creator. The image of the created co-creator is one response, elaborated by Philip Hefner, to our being questioned, to the questions Who are we? and What ought we to be doing with our creativity? Vítor Westhelle (theology) suggests that the strength of the image lies in its gathering together Western philosophical and theological traditions that reflect on human nature; he also lays bare what he considers

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to be its major weakness—the inability to describe "situations of being on the edge." Jerome Stone (theology/philosophy) places Hefner and the concept within "an Anglo-American viewpoint that is within neither the dominant Western nor the postmodern paradigm." For anthropologist William Irons the scientific element in the created co-creator concept is the proposal that the purpose of human creativity is to fashion a wholesome environment for the planet through altruistic behavior. He assesses the viability of such a proposal, placing his discussion within a nontheist perspective. Manuel Doncel (physics/theology) provides a fundamental theological framework within which the import of the created co-creator concept can be interpreted. Doncel introduces readers to both Christian (*kenosis*) and Jewish (*zimzum*) ideas that speak of a "self-emptying" God who thereby empowers the world to be free.

Ann Pederson (theology) draws upon her work in health-care ethics and her experience with dying persons to suggest the usefulness of the created co-creator image for those fields of concern. Anna Case-Winters (theology) assesses the significance of the created co-creator for interpreting our relationship to nature. Philosopher and theologian Gregory Peterson deals with what Hefner's concept claims and what it does not claim, its strengths and its weaknesses, particularly with respect to issues of reductionism, biological selfishness, freedom, and environmental ethics. He maps the incompleteness of the concept and the ways in which it should be developed further. Roger Willer (theology, ethics) concentrates chiefly on the adequacy of the idea for Christian thinking and action. He raises critical questions concerning the very term, as well the "insufficient attention" that it gives to issues of responsibility and obligation. He suggests that the "responsibility ethics" of Hans Jonas could be a useful complement to the concept. Two poems by Alan Nordstrom serve as frame for this discussion; they are placed at the beginning and the end of the section, intentionally suggesting yet deeper dimensions of human nature.

The reader who works through this symposium will encounter a host of issues related to human being as questioner and as the creature who is called into question. Marc Bekoff (biology, ecology) and Jan Nystrom (ecology, activism) in effect formulate the questions that other animals pose to us—an issue of human identity that is far from settled. They do so by elaborating the work of Rachel Carson, whose *Silent Spring* in 1962 marked the beginning of an epoch for ecology. Buddhist scholar Brian Brown clarifies the Buddhist principle of "dependent co-origination" as a clue to the fundamental character of human being and its relation to the rest of the world in an ethic of "mindful awareness."

Nina Azari (neuroscience, theology) and Dieter Birnbacher (philosophy) take note of "points of convergence between psychological, philosophical, and neuroscientific accounts of emotion" in the effort to develop a more adequate understanding of religious experience. The thorny issue

of freedom and determinism in the perspective of neurobiology occupies the attention of psychiatrist and pastor Guus Labooy. Paul Carr (physics) approaches the same issue within the insights of fractal geometry. Physicist V. V. Raman's article goes to the heart of faith and doubt as components of both religion and science. He contributes clarity on the subject by making necessary distinctions.

We conclude this issue with a piece by Phillip Thompson that describes the brief, chance encounter between a Trappist monk, Thomas Merton (who was both mystic and literary figure), and a pioneer of nuclear physics, Leo Szilard (whose biography is subtitled *Science as a Mode of Being*); both of these figures were obsessed with the question of being human. Their encounter was rich with possibilities but aborted before it could bear fruit.

The ancient Hebrew poet could not have foreseen the terrain of our journey today toward understanding who we are and what we ought to be doing. But that poet stated the question that we will never cease exploring and never fully resolve. The articles in this issue testify to both of these aspects—the perennial necessity and the never-ending struggle of the questioning.

—Philip Hefner

Fortieth Anniversary Symposium

In the next issue, we move into our fortieth year, and we mark the anniversary with a year-long symposium. In each of the four issues of 2005 we will publish articles that reflect on the theme "Science, Religion, and Secularity in a Technological Society." In the March issue, the initial statement of the theme is an article by John Caiazza titled "Athens, Jerusalem, and the Arrival of Techno-Secularism." Hava Tirosh Samuelson, John Polkinghorne, Philip Clayton, Harold Morowitz, and Ervin Laszlo provide commentaries.

Thinkpiece

PLACING OURSELVES

by George W. Fisher

Abstract. This essay set the stage for the 2003 Star Island conversation on "Ecomorality" by remembering the cosmic, geological, and ecological context in which we live. It reflects on the immense journey that matter and life have traveled from the beginning and reminds us that, throughout that journey, all that was and is emerged from a fertile mix of individual well-being and reciprocity. But to sense the meaning of the story and to know our place in it takes more than hearing its broad outline. We need to remember the individual actors who have gone before us; to read their stories in particular places, like the rocks and ecosystems of Star Island; and to listen carefully for the meaning to be found in those actors and those places. Those stories, actors, and places invite us to sense the sacredness of our time and place and to reconsecrate our selves and our energies to developing an ethic that honors our common ancestry.

Keywords: cosmic story; Earth Charter; ecosystem; environment; ethics; evolution; globalization; justice; moral discernment; place; policy; population; resources; sustainability.

The human evolutionary journey is fast approaching a critical transition. During the next half century, the world population is expected to level off at approximately 9 billion people, and the economic worldview, long grounded in assumptions of growth, will need to shift to a model of sustainability.

Most discussions of sustainability focus on the need to maximize access to the resources that sustain Western civilization. We must, of course, do

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what we can to find resources, to use them efficiently, and to avoid disrupting the Earth system as we do so. But it is very unlikely that the resource base can accommodate the unfettered demands of 9 billion people for energy, water, industrial materials, or the capacity to absorb waste products. Consequently, we will have to allocate resources between competing needs—between human needs and those of the ecosystems that sustain us, between present human needs and those of future generations, and between the legitimate needs of developing countries and the expectations of wealthy nations. Decisions about how best to make these allocations will obviously require sound scientific, economic, and political input. But they also will require moral discernment and so can help to ground the topic of our conference, "Ecomorality."[1]

The Earth Charter outlines many elements of these decisions and calls all of us, as people of Earth, to "declare our responsibility to one another, to the greater community of life, and to future generations" and to accept the preservation of "Earth's vitality, diversity, and beauty [as] a sacred trust" (Earth Charter Commission 2000). Most of us at this conference would probably affirm those commitments as a kind of creedal statement. But, important as that is, we must go beyond simply assenting to the intellectual validity of the Earth Charter and begin to incorporate the principles it expresses into the decisions we make daily about the products and foods we buy, the political decisions we make, and the policies we urge our governments to adopt. To do that—to change the ways in which we live—we need to understand this sacred trust in ways that go deeper than intellectual affirmation, ways that go to the core of our being. Thinking of Earth as sacred is not enough. We must also *feel* its sacredness deep in our souls.

That is not easy. Feeling Earth's sacredness involves the kind of knowledge that philosophers call knowing by acquaintance—the way that we know and love a close friend or a familiar place (Stump 2000).[2] That kind of knowledge is grounded in compelling personal experience of a person or place, and, unfortunately, many of us in the developed world are so isolated from Earth and its creatures by the trappings of civilization that we have little real experience of Earth as it really is. We are insulated from nature by grocery stores that offer fresh strawberries all winter, by air-conditioned homes that banish the summer heat, and by irrigation systems that allow lush lawns even in Arizona. We move so frequently that we never come to know even a small patch of land well enough for it to feel sacred to us. Many of us live in suburban neighborhoods barely distinguishable from one another and have little sense of what it means to feel rooted in community. Few of us spend enough time in other cultures to know the men and women of those societies as friends. Even fewer of us have the experience of getting to know animals in the wild.

So how can we come to know this Earth, other creatures, and our fellow humans well enough for their welfare to matter deeply to us? Part of the

answer is to find places where we can experience Earth as it is: places where we can hear the waves crashing on the rocks; places where we can see plants and trees struggling to survive wind and wave; places where we have to be sparing in our use of water. I sense that many of you have come to know this place, Star Island, as sacred in precisely these ways.

But placing ourselves spatially is not enough. We also need to place ourselves in time, to remember the events that have brought us to this place and this time. I invite you to listen to the story of our evolutionary journey and to reflect on it in ways that go beyond intellectual understanding—the dates, the places, the names of species that have come and gone. I invite you to reflect on the story in ways that will help you to know the creatures whose lives individually and collectively *are* that story.

Retracing Our Evolutionary Journey

In trying to experience the evolutionary story, the immense sweep of time involved poses a problem. The age of the cosmos is measured in billions of years, a time span so far beyond our own experience that we cannot grasp it. It may help to visualize the cosmic story as a physical journey, one in which we move just one millimeter each year, one meter each millennium. I'm now 66 years old, so on that scale my life would be represented by a journey 66 millimeters long. Retracing our steps to the discovery of America five hundred years ago would take a journey of half a meter. Going back to the time of Christ would take two meters, roughly the span of my arms, stretched wide. Returning to the time of the Sumerian city-states would take seven meters, roughly the distance from this podium to the fifth row of chairs.

Journeying at that rate back to the origin of Earth 4.6 billion years ago would take us all the way across the United States, from here on Star Island, New Hampshire,[3] to San Francisco, California. Going back to the Big Bang 13.7 billion years ago on a great circle route would take us on across the Pacific, all the way to Australia's Great Barrier Reef.

Let's now reverse course and retrace our steps from the Big Bang on the Barrier Reef to the present, represented by this podium.[4] It all began in a cauldron of creativity from which space, time, the physical constants that govern everything, and all the matter in the cosmos flashed into being in just four seconds. At first that matter was a plasma so hot that only solitary particles could exist, but as the brew expanded, it cooled and condensed—first into simple atomic nuclei, then into atoms of hydrogen and helium—all within a few hundred thousand years, when our journey from the Great Barrier Reef has taken us less than a kilometer, barely beyond the surf zone.

Over the next nine billion years—traveling nine thousand kilometers across the Pacific, millimeter by millimeter—increasingly complex atoms emerged from reactions in dense stars and supernovae. Carbon was especially

tricky. Had the universe emerged with even slightly different values of the physical constants, carbon could never have formed, and carbon-based life could never have emerged.

As atoms became more diverse, they combined to make molecules—first sulfides, oxides, silicates, and simple organic molecules such as methane, then the more complex organic molecules needed for life. Those early organic molecules contained the promise of life, at that point a mere possibility latent in those fertile atoms and molecules and in the physical constants which made them possible, a possibility waiting for a moment and a place that might nurture life into being. That place began to emerge 4.6 billion years ago, as our journey reaches San Francisco, and Earth began to form by condensation of the solar nebula into small chunks of rock. Those chunks gradually grew by attracting others to form larger meteorites and eventually the earth, moon, and other planets. That process of accretion took a little more than half a billion years and left a landscape pocked with craters, very like the lunar surface today.

But there was a crucial difference. Earth had a gravitational field strong enough to retain an atmosphere, and, once the surface was cool enough, water began to condense into warm, salty oceans as our journey approaches Salt Lake in Utah. Those oceans provided just the conditions for life to emerge from the organic molecules deposited on Earth during the bombardment, and a biosphere capable of photosynthesis began to take shape almost immediately after the bombardment ended.

For more than three billion years, the time it takes us to travel from Salt Lake to Buffalo, New York, life consisted mostly of single-celled organisms such as bacteria and algae. A little more than half a billion years ago, as we cross the Niagara River at Buffalo, we meet an astonishing variety of multicellular organisms. They emerged during a period of rapid fluctuation in the chemistry of both seawater and atmosphere. It is not yet clear whether these environmental changes triggered a spurt of rapid evolution or whether the appearance of these novel organisms changed the environment. However they emerged, these organisms were much more diverse than earlier life forms, and their diversity required them to form rich, complexly connected ecosystems, making real community possible for the first time.

Those first ecosystems that sustained multicellular organisms were confined to the oceans. It took another 130 million years—the journey from Buffalo to Syracuse, New York—for plants to venture onto the land, making a terrestrial biosphere possible. But sustaining terrestrial ecosystems is not easy. Erosion is constantly reshaping the landscape, removing the soil and with it the carbon and nutrients stored there. Over the years those nutrients are carried to the oceans and buried out of the photic zone and out of the reach of photosynthesis. If not somehow compensated, erosion would render the continents infertile, and terrestrial life would cease to be. Fortunately for you and for me, that does not happen, because both conti-

nental and oceanic crust are constantly stirred by convection currents in Earth's mantle, the thick layer of hot, sticky rock between the crust and the core. Those convection currents shift the continents and fold the sediments deposited in the ocean basins into the mantle, where they are melted and reborn as volcanic material to be erupted onto the continents. That slow, majestic drumbeat of mantle convection—visible in the rhythmic opening and closing of the Atlantic ocean basin every 200 million years or so—is a vital part of the Earth system that sustains life as we know it.

After another 200 million years, as we reach Albany, New York, dinosaurs begin to dominate terrestrial systems. They were part of a well-adjusted ecosystem that lasted roughly 150 million years until it was disrupted by a catastrophic meteorite impact 65 million years ago, as our journey reaches Manchester, New Hampshire.

That calamity was one of five major extinctions within the last half billion years. It is the best-known extinction but not the most intense; that honor belongs to an extinction that occurred 250 million years ago and eliminated about 80 percent of the species then living. Most species have proven to be rather transient. Estimates vary, but roughly 99 percent of the species that have emerged are now extinct. That was tragic for those species. The animals, at least, wanted to live. They suffered when they died. Some died trying to protect their young. The message of evolution, of course, is that we are their progeny, the beneficiaries of their struggle.

That, perhaps, gives us a sense of just how sacred a trust we hold, how hallowed the ground we walk. I am reminded of Lincoln's words at Gettysburg. Paraphrasing slightly: "In a larger sense, we cannot dedicate, we cannot hallow this ground—the brave creatures, now dead, who struggled here, have hallowed it far above our poor power to add or subtract."

Despite the pain and the suffering that individual animals experienced, the biosphere as a whole—life—survived those extinctions, always finding new ways of flourishing, always finding some way for novelty to emerge.

The disappearance of dinosaurs 65 million years ago and the emergence of mammals shows the profound effect that chance events like a meteorite impact can have on the course of evolution. Mammals had lived as marginal members of the global ecosystem for 150 million years; had we been there, we never would have expected them to dominate the scene. But in just ten million years, they diversified to fill the ecological space vacated by the dinosaurs. Tiny at first, they became larger and more specialized over time, and eventually our species emerged from the primate line.

Seen from the perspective of the journey from the Great Barrier Reef, the human story seems almost an afterthought. The first tool-using hominids emerged as our journey takes us past Appledore Island, barely two kilometers west of here. We meet the Cro-Magnon cave artists of Southern France outside on the porch, just thirty meters from the podium. And all of human history, from the Sumerian city-states to the present, fits

within the first five rows of chairs in this room. The entire span of modernity and the rapid population growth that accompanied it is a mere half-meter, roughly the size of the podium from which I am speaking. That is a humbling realization. Ecologically, it is also a warning. Species that take over a landscape quickly often disappear as rapidly.

Sacredness, Creativity, and Reconciliation

Other speakers this week will explore details of the way in which novelty has emerged; help us to know hawks, baboons, and gorillas; think about the grounds of ethical principles that transcend human welfare; and help us to nurture the empathy within us. Even the rocks that we walk over as we wander the island have a story to tell. Some were deeply buried and complexly deformed during the last closing of the Atlantic, others were once hot magma injected into fractures formed when mantle convection reversed and the present Atlantic basin began to open. In that contrast, we can sense the insistent rhythm of mantle convection that has sustained terrestrial life for 400 million years. And everywhere on the island, we will hear the quiet, insistent sound of the waves, reminding us that oceans have nurtured life on Earth for nearly four billion years.

As we explore these elements of the Earth story, we must watch for the glimmering of insights that can help us to understand the sacred trust with which we are charged, the sacred places in time and space from which we can draw wisdom about how we might learn to live in our time and place.

At every stage of this evolutionary journey, we find complexity and diversity emerging from simple beginnings. Physics and chemistry first gave us atoms, then molecules. Biology first gave us single-celled organisms, then multicellular organisms, then integrated ecosystems. That process of stepwise emergence was the key to the evolutionary dynamic. At each stage, possibilities remained latent until conditions were ripe for the emergence of novel features that enabled a breakthrough to a new frontier of complexity and creativity. At each level, novelty emerged out of fertile relationships among already existing ingredients—particles, atoms, or genes—through a sort of tinkering that stirred, mixed, and rearranged those ingredients in new ways, some of which turned out to be fertile ground for the emergence of yet more novelty, yet more creativity.

I can sense the sacredness in that creativity in the diverse ecosystems that support us—in the fecundity of old-growth forests of the Pacific Northwest, in the plants that somehow find water in the cliffs and canyons of the Colorado Plateau, and in second-growth hardwood forests mantling Appalachian ridges, taking back abandoned pastures, even coal mines. In those places I can almost touch the quiet, serendipitous creativity that lies at the base of all that is.

We can sense the workings of that creativity in the patterns of ecological development. The energy for life comes from the ability of plants to use

solar energy to produce energy-rich biomolecules from atmospheric carbon dioxide, water, and nutrients. That chemical energy and those nutrients are then cycled through the food chain, moving from plants to herbivores and to one or more levels of carnivores. But the system doesn't stop with the "top" carnivores. The entire biochemical system is closed to everything except energy and must recycle everything else—carbon, nutrients, and water. Plants and animals produce a lot of waste organic matter, and if that waste were allowed to accumulate, the carbon and nutrients in that waste would be lost, and the system would gradually cease to function. Microorganisms, fungi, and bacteria play a crucial role by consuming dead organic material and converting the carbon and nutrients back into a form in which they can be endlessly recycled.

Healthy ecosystems are communities in which all of the species are mutually dependent. Every species depends on other species to consume the waste products that it produces and to supply the carbon, water, energy, and nutrients that it needs. The evolutionary success of a species depends not just upon its ability to reproduce but also upon its ability to function as part of an integrated community of organisms.

A careful look at how ecosystems sustain themselves in ways that turn out to be so creative reveals four key principles (Fisher 2002):

1. Every healthy ecosystem is an integrated community in which each organism has a role to play. No complex organisms can live alone. Like healthy families, in which individuals are both self-differentiated and mutually dependent, species constituting healthy ecosystems flourish by a balanced combination of individual well-being and fruitful relationship with one another—a fertile mix of individuality and reciprocity.

2. The continued health of every ecosystem depends on its ability to recycle energy and nutrients and to continue doing so despite shocks to the system by changes in the environment or even loss of a species or two. It is the system's resilience, its ability to respond creatively to change, that counts in the long run.

3. The entire system is intensely opportunistic. Whenever there is an opportunity to use waste energy or nutrients productively, changes tend to occur. New species emerge, or existing species adapt to use the waste. As they do, they forge another link for circulating energy or nutrients, and so contribute greater resilience to the system as a whole.

4. Processes of change tend to be highly contingent. The precise way in which the system responds to opportunity can depend very much upon what species or even what individuals happen to be on hand when opportunity emerges and upon how those particular organisms respond to the opportunities that they sense before them.

We are often told that the evolutionary dynamic is grounded in competition and that if we want to live naturally we must live out of radical individualism. But if we look closely at healthy ecosystems, we see that

individualism is always tempered by reciprocity. Many ecologists argue that symbiosis and mutualism are actually more common than purely competitive relationships.

We in modern times seem to have taken the notion of individualism too far. We have missed the importance of reciprocity and the joy of living in balanced relationship. Our communities have become untangled, perhaps most obviously in the failure of our cities to work as they might. We have become estranged from one another and from nature.

I am much taken with a book by the Jesuit Philip Sheldrake, *Spaces for the Sacred: Places, Memory, and Identity* (2001). Sheldrake writes beautifully about the relationship between place and sacredness in place and in community and suggests that we see our task as one of reconciliation—as he puts it, the task of reconsecrating desecrated places. He invites us to look again at relationships, memories, and identities and to sense the sacred in all.

That, for me, is the invitation of this week: to take the time to sense the sacredness in this time and this place, in the relationships that connect us to one another and to the land.

But Sheldrake also warns us not to succumb to the temptation merely to bask in the satisfying glow of the sacred, in the richness of relationships with nature and with one another. When we leave this place and this time, we must be prepared to devote the energy gained here to the hard work of a reconciliation that continually seeks to go further and deeper—a reconciliation that will be profoundly costly but infinitely worthwhile, because in that reconciliation we will at last come to know our place in the cosmos.

Note

1. A version of this essay was presented at the fiftieth annual conference of IRAS, "Ecomorality," Star Island, New Hampshire, 26 July 2003.
2. The distinction between intellectual knowledge and knowing by acquaintance is clearer in the languages of continental Europe than it is in English, which lumps both kinds of understanding into the single noun *knowledge*. French, for example, makes a clear distinction between the noun *savoir*, which represents intellectual knowledge, and the noun *connaissance*, which represents knowing by acquaintance.
3. Star Island is about 16 kilometers (10 miles) off the Atlantic coast at Portsmouth, NH.
4. The version of the cosmic story that follows is adapted from a version published in the *Encyclopedia of Life Support Systems* (Fisher 2002).

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Symposium on the Created Co-Creator

MAKING IS FINDING

by Alan Nordstrom

"Man makes himself," most modern thinkers say:
By freely chosen acts we shape our lives,
Becoming what we see and do, like clay
Taking expression from our conscious knives.

But ancient sages saw us differently:
They saw a soul-seed sprouting from within,
Molding our form and feature gradually
Until we bloomed to virtue or to sin.

So, "Do we make or find ourselves?" I ask:
I think it's both, like sculpting from a block
Of marble, chipping away the outer mask
That hides identity in selfless rock.

With work an artful figure is revealed,
By making found, a flower unconcealed.

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THE POET, THE PRACTITIONER, AND THE BEHOLDER: REMARKS ON PHILIP HEFNER'S "CREATED CO-CREATOR"

by Vítor Westhelle

Abstract. Philip Hefner's notion of the created co-creator is treated here as a concept in its procedural sense. The concept as a theoretical construct offers a substantial account of human capabilities, their ingenuity to transcend the intrinsic and bring about a new order of growth and development. However, the limitation of this concept is its neatness. It suppresses that which cannot be suppressed. This otherwise straightforward concept fails to give a realistic description of the human in situations of being on the edge that points to an end where there are no alternatives or negotiations. What is promising in the created co-creator is that it is able to incorporate elements of the Western philosophical and theological anthropology. I propose that the created co-creator reflects and elaborates the Aristotelian human attributes of *theoria*, *praxis*, and *poiesis*.

Keywords: analogy; created co-creator; irony; *poiesis*; *praxis*; *theoria*.

My remarks here on Philip Hefner's notion of the created co-creator are developed in two stages. I attempt first to show what the notion, in my opinion, does not do—what in my reading it lacks. Then I try to demonstrate what I see it accomplishing. But before I elaborate on those two points I offer a brief introduction.

Created co-creator is a neat idea, in the sense that it has distinct contours. It is well organized and able to serve many purposes. It has been used as a figure of speech, a trope, a metaphor, and a symbol with an array of denotations and connotations (d'Aquili 1994; Gerhart 1994; Gilkey 1995; Hefner 2002). However, I am concerned here to treat it as a concept, a *Begriff* in the Hegelian sense, a theoretical construct that anchors a

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broad theological and anthropological system. It purports to present an encompassing vision of the human as a crossing into transcendence. Created co-creator is the concept that offers a tangible description of what in more abstract terms has been described as human self-transcendence, the ability of human beings to go beyond their natural endowments by creating culture and inventing environments of belonging. The concept of the created co-creator is thus able to address anthropological notions that not long ago were absent from the theological vocabulary but now are decisive for it, such as *mestizaje*, hybridity, emergence, and even Donna Haraway's "cyborg" (1991, 149–81).

There is an aura of optimism surrounding the notion of the created co-creator that could be attributed to an anthropology that resembles or finds its origin in the famous dictum of Irenaeus (one of Hefner's favorite theologians of the early church): "The glory of God is a living human being." But the Hefnerian notion of the created co-creator teaches us also to trust and believe that modernity, this unfinished project led by a restless critical search for certainty and rejection of all truisms, can indeed work—and as it claims it will, if we are responsible and willing to make some corrections as we move along. As an analogy in contemporary theory, Hefner's program is to theological anthropology and to the interface between science and religion what Jürgen Habermas's is to modern philosophical rationality, morality, and aesthetics. Both thinkers have an unassailable trust and confidence in human capabilities and open possibilities of growth and development, yet for Hefner, unlike Habermas, this is predicated on the human relation to and dependence on God.

Such an affirmative anthropology contrasts sharply with a Hobbesian pessimistic view of "man as a wolf against man" (*homo homini lupus*). This road not taken by Hefner finds expression in his own Lutheran theological heritage in Mathias Flacius Illyricus's condemned argument that with original sin human beings had the imprint of the image of God replaced by the image of the devil. Hefner's Lutheran lineage is closer in this respect to the affirmative anthropology of the likes of Andreas Osiander—who, it is worth noting, was probably the first theologian to engage "modern" science by defending and writing the preface for Nicholas Copernicus's *De revolutionibus orbium* in 1543.

Shadows

What the concept of the created co-creator does not accomplish, in my opinion, is to present a plausible account of the human in circumstances where there is no longer an economy, no middle, crossing-over, self-transcendence, or mediations. For example, I cannot read the created co-creator in the face of the Palestinian teenage girl who wraps herself in explosives. Neither can I read the created co-creator in the skillful U.S. Air Force pilot

who at 35,000 feet drops bombs on Iraqi villages without ever seeing a human target. The created co-creator does not account for a reality in which there is no commerce anymore, in which there are no longer means, transactions, or an economy. Such a condition can be described by its precisely symmetrical opposite: the gift. The phenomenology of being on the edge and that of the gift are similar in that they mirror each other. Both signal the end of an exchange, of commerce and trade—in the case of the gift, by sheer presence; in the case of what I miss in the created co-creator, by the experience of utter absence.

Let me present an illustration from the arts. In 1936 Salvador Dali painted "Soft Construction with Boiled Beans: Premonition of Civil War."[1] This is probably the most dramatic representation of the years leading to the civil war in Spain. The painting is of a body tearing itself apart and forming a sort of a frame in which the middle is just emptiness set in the backdrop of a clouded sky, suggesting an impending storm. This painting, less known than Picasso's "Guernica,"[2] is however at least as powerful in presenting a world in which human beings no longer find any meaning or mediation by which life's possibilities might be negotiated; humans are no longer able to construct their subjectivity. Unlike in "Guernica," where the dim light of an electric bulb seems to indicate at least a possible source of hope, in "Premonition of Civil War" the heavy sky in the background does not suggest any hope for relief.

These anthropological observations are not alien to a central feature of Christian theology. Let me call it the apocalyptic. Regardless of its validity as the "mother of Christian theology," as Ernst Käsemann has argued (1969), it played an important role particularly in early Christian thought and has continued throughout the ages. And even if it is now not featured in most of mainstream theology, it still addresses the plight of millions if not billions of people in the world. It accounts for an experience that is exemplary, given in Kierkegaard's discussion of the sacrifice of Isaac, in which hope is against all hope. In the experience of facing the end of one's world, in the surrendering of any guarantee, or allowing for any negotiation, another, inverted world announces itself, and nothing and everything collide. In the trespassing of this boundary between worlds, the known that is negated and the unknown that is imminent, inscribed as a mere cipher, we have the apocalyptic condition. Michel de Certeau (1984) has defined this condition as one in which there is no longer strategy. Tactics is the end in itself.

The concept of the created co-creator seems to me to inscribe itself in the great and venerable tradition of mediation theology. The assumption that it is possible to transit between the mystery of the eternal and the understanding, or rationality, of historical transience grounds mediation theology. The very attempt to engage or even yoke science and religion or theology and culture lies at the very core of a theology of mediation. It

relies on the possibility of making analogical moves between the divine *theos* and the human *logos*. However, such a theological stance is opposed by a minority report that equally belongs to theology, namely, the diacritical tradition, which often emerges only as a counterpoint, yet a decisive one. There is no apology necessary for bluntly aligning the created co-creator with mediation or analogical theology, which is after all the majority report, the received view in modern theology.

However, in my reading of Hefner's theology there is a vein in his theological mine that has always resisted precisely the surrendering of theology to a metaphysical system, to a system ruled by analogy. And I am suggesting that I do not see this reflected in the notion of the created co-creator. The concept seems to be ruled by a potent analogical argument alone. What I miss is the diacritical countermove of irony. This move that I find missing is well reflected by the anecdote about his grandmother's recipe mentioned in the opening pages of Hefner's *The Human Factor* (1993, xiii–xiv): "This is a joke," but it "may work out." In this there is irony, the moment of dissonance, and a diacritical noise in the midst of a regulated system, which I do not find expressed in the created co-creator. What Nadine Gordimer once said about literary texts could be said about theology, even if only in part, but indeed a part: a narrative must strike the reader like a pistol shot in the middle of a symphonic performance.

This is what I think the concept of the created co-creator does not do: it suppresses the ironic gesture, the dissonance that comes along with a difference that cannot be concealed. It is too clean and neat for the apocalyptic dis-ease of being on the edge of human endurance, at the point where rationality cannot reason itself out but turns against itself and becomes demonic. But more seriously, jest and laughter are exiled from academia.

Analogies

After these critical remarks, though what the created co-creator does is already implied, I would like to lay it out in a more systematic form. There is a simplicity about the concept that is elegant and suggests straightforwardness. It is remarkable to observe how a great concept can bear the weight and impel a vast theological argument. Like a painter who renders into the canvas what books would fail to express, such is the beauty of theological concepts. They are to theology what a prayer might be to religion, or a poem to art, or a formula to mathematics. They evoke a world and seek to order it. Just think about some of these concepts that still inhabit the theological vocabulary: *logos*, *theosis*, *basileia*, *metanoia*, *donum superadditum*, justification, *mirabilem mutacionem*, absolute dependence, ultimate concern, *totaliter aliter*, and so on. (They are often kept in the languages in which they were originally uttered exactly because they are concepts; they are not common nouns with a semantic value comprised by and confined to a dictionary entry.)

Created co-creator belongs to this category of concepts. What it does is evoke images and create rational frames that are embedded in it. The concept that Hefner coined evokes thoughts concerning the human nature in its relationship to both God and the rest of nature, human and nonhuman, that theology calls creation. In doing that it tries to isolate the uniqueness of the human, suggesting core elements of what belongs to Western philosophical and theological anthropology (Hefner 1973; 1997; 2001). Although Hefner may never have made this argument, I propose that the genealogy of the concept of the created co-creator can be traced back to the Book V of Aristotle's *Metaphysics*, which defined human beings by three fundamental attributes inherent in their nature: *poiesis*, *praxis*, and *theoria*.

The elaboration of Aristotle's argument is aided by analogy to the Greek theater. There are three basic components that are part of theater. First, there is the building of the stage and the writing of the play itself. Second, there is its actual performance. Finally, there are the spectators. The first element is what is called *poiesis*, the act of creating something that ends in an objective reality. The second is called *praxis*, the craft of doing something for the sake of doing it well. The third is called *theoria*, the art of observing and being exposed to something. I suggest that the created co-creator is a theological elaboration of precisely these three distinct human attributes. Each one is in a directly proportional relation to the three component parts of Hefner's concept of the created co-creator. I present them in the inverse order in which they are formulated. The first is a noun (creator), the second is a prefix (co-), and the third a verb (created). The three together reflect Aristotle's attributes of what it means to be human.

Poiesis: The created co-creator is a poet. The word refers to the ability to create something that was not there before. It produces an objective result (like a stage, or the text of a play, to keep the analogy of the theater). The word is used for all human labor, physical and mental (the etymological root of the English "poetry"). The "poet" is the carpenter who makes a chair out of rough wood. The poet is also then the one who says that which brings about or evokes a new meaning in language, which had not been expressed exactly like that before. In the Septuagint *poiesis* describes God's own creation of the world. As the Nicene Creed literally says, God is the poet of heaven and earth (*poieten ouranou kai ges*). In the New Testament *poiesis* is also used for the miracles of Jesus. The poet enunciates a new reality and brings it to life. In the Creed this is the work of the Spirit who is described as *zoopoion*, the giver of life. The poet labors. And as long as human labor is creative it belongs to the same activity that is also attributed to God, to Jesus, and to the Spirit. This is probably the most scandalous element in Hefner's formulation. It places the human creative activity alongside God's. The argument against the formula resorts to the exclusive Hebrew word *bara* (in the first verse of the book of Genesis) to

describe only God's creation. This verb is never used in connection with human activity. But the Septuagint translates it as *poien*, which Claus Westermann defends by pointing out that in many other places of the Hebrew Scriptures words used to describe God's creating activity are also used for humans (Westhelle 1986).

Praxis: The prefix *co-* in created co-creator suggests relations, implies mutuality and partnership. Most interpretations of the created co-creator I have seen seem to assume that this partnership is with God and with God alone. I propose that the first inferred meaning of the prefix refers to the human ability to do what we do because we are in *human* partnership and relations of exchange and interaction within the human community. This is what the word *praxis* entails. Strictly speaking, a practitioner is a performer immersed in a web of communicative relations. While this is and must also be ultimately applied to our cooperation with God, we ought not to forget that it necessarily implies our horizontal fellowship in relations of solidarity among ourselves. It is because of this solidarity, because of our capability of being for one another, even to the point of altruism, that also establishes our relationship to God. It is an old rabbinic tradition to interpret the first account of the creation of *Adam* in Genesis as the creation of the first interhuman relationship (*adam* = male + female). And from there it follows that it is this archetypal entity that is endowed with the image of God, therefore also capable of co-union (communion) with God. This is what *praxis* entails: the communicative action and interaction for the sake of doing it well, as Plato defined it in the *Republic*. In the analogy of the theater, it is what the performers do, and after the performance is over nothing objective is left. What was performed survives in the intersubjective experiences that have shaped the characters. I believe that this is what underlies Hefner's ecclesiology as it was presented in his Hein-Fry lectures some years ago (Hefner 1998a, b, c). The church is about this praxis of communion and mutuality. To phrase it in the words of the character Celie in Alice Walker's *The Color Purple*: "People go to church to *share* God, not find God" (1982, 176)

Finally we come to the first word in the created co-creator triad. This for me corresponds to Aristotle's *theoria*, the act of contemplating, observing, envisioning, "speculating" (which is also the third stage of the medieval rule of piety: *contemplatio*). This is what being theoretical technically means. Phrasing it in another way, and taking an insight from the anthropic principle, it would look like this. If we are only able to observe that which has made possible our emergence as creatures, then the original conditions that presuppose existence cannot be empirically observed but only contemplated, speculated, envisioned. Being created means, therefore, to recognize that we are not that which ultimately brings us about. We are not the cause or origin of our own selves. We can only "see" it, as the apostle Paul says, with the eyes of faith. All creation in this sense is a

piece of poetry originally engendered by another mind, another breath, another Spirit that has brought us out of that which was not, out of anything that can be empirically established. Having been uniquely created calls us then to be beholders of the "mazing" realities of the world that sustains us but cannot explain its own origin, not even the fact that it did not need to be so. And this did-not-need-to-be-so we can only gaze at and contemplate by an "amazing" vision (*visio*), which in theology is called the gift of grace.

These three aspects that are so succinctly put together in the concept of the created co-creator reflect three basic categories that are developed by Hefner. *Created* is expressed by the doctrine of the creation out of nothing (*creatio ex nihilo*). The prefix *co-* gives expression and wraps in itself the whole doctrine of the image of God (*imago Dei*). *Creator* reflects that in which we are immersed and are part of; it reflects participation in an ongoing creation, *creatio continua*. Hefner's theology of creation, his ecclesiology, and his Christology are embedded in his concept of the created co-creator.

All said and done, would it not be derisively entertaining to discover that the hyphen in co-creator was indeed a cipher for the missing irony that I curl my lip at in the concept? The joke then would be on me, but it "may work out."

Note

A version of this essay was delivered at the Chicago Advanced Seminar in Religion and Science, "The Created Co-Creator: Interpreting Science, Technology, and Theology," organized by the Zygon Center for Religion and Science, Spring 2002.

1. The painting can be viewed at *http://www.philamuseum.org/collections/modern_contemporary/1950-134-41.shtml.*
2. The painting can be viewed at *http://museoreinasofia.mcu.es/coleccion/coleccion_ING.php.*

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PHILIP HEFNER AND THE MODERNIST/ POSTMODERNIST DIVIDE

by Jerome A. Stone

Abstract. Philip Hefner is part of neither the dominant Western paradigm nor the usual postmodernist reaction against it. He belongs within an Anglo-American viewpoint that also is within neither the dominant Western nor the postmodernist paradigm. Herein I sketch the differences between these paradigms. I elaborate Hefner's theology of the created co-creator to show where Hefner constrasts with them and then contrast his ideas with those of two contemporary theologians who fit into the second paradigm, George Lindbeck and Mark C. Taylor.

Keywords: created co-creator; Philip Hefner; George Lindbeck; religion-science dialogue; Mark C. Taylor; J. Wentzel van Huyssteen.

In the reading of Philip Hefner that I offer, he is not part of the standard Western paradigm as often portrayed. Nor is he part of the standard postmodernist reaction against this Western paradigm. He belongs rather to an Anglo-American viewpoint that is neither part of the standard Western nor the common postmodernist viewpoints.

In this essay I outline the differences between the Western and postmodernist paradigms and then sketch Hefner's theology of the created co-creator to show how he differs from these approaches, a point sometimes overlooked in reading Hefner. Then I contrast his theology with those of George Lindbeck and Mark C. Taylor, who fit within the postmodernist paradigm.

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Three Paradigms

The dominant Western paradigm has involved (1) a simplification of experience by means of dichotomies (self/other, nature/freedom, mind/body, and so on), (2) a valuing of abstraction and stability, (3) the quest for certainty, (4) a search for foundations and proper method, and (5) a desire for precision of language. An alternative approach, often called postmodernism, including Nietzsche, Heidegger, and poststructuralists, developed counterthemes: (1) an overthrow of dichotomies, (2) a focus on the particular and transitory, (3) a recognition of uncertainty, (4) antifoundationalism and antimethodologism, and (5) a polyvalent language. Because these are mirror images of the first set of themes, they support, ironically, the dichotomous tendency of Western thought.

There is a third approach found in many American and British writers (and a few Europeans) including pragmatists, process thinkers, and the Chicago school theologians of the first two-thirds of the last century. This approach advances beyond the older Western tradition without falling into the excesses of the newer Continental paradigm. Many contemporary thinkers ignore this approach. Their position would be strengthened if they could show in their arguments that their thought is more adequate than this Anglo-American approach. By ignoring it and concentrating on rejecting the older paradigm, their arguments involve a false dichotomy. At worst their positions both suffer from the excesses of a one-sided rejection of an old viewpoint and fail to draw from the resources of the newer Anglo-American approach.

Philosopher Calvin Schrag, in *The Resources of Rationality: A Response to the Postmodern Challenge*, points out that postmodernism "seems to offer a liberation" from dichotomous thinking, but "postmodern reflection buys back into the original dichotomy by setting the universal, the metanarrational, and the consensual against the multiple, the local, and the dissensual" (Schrag 1992, 172). A number of writers respond to the postmodern challenge by rethinking the rational and scientific demands of human inquiry. Process thinkers generally and many pragmatists, including Richard Bernstein (1983; 1992) and Jeffrey Stout (2004), seek to give appropriate due to both the resources of modernism and the varied critiques of postmodernism. Other philosophers and theologians, with differing vocabulary and varying strategies, do likewise, including Harold Brown (1988), Frederick Ferré (1996; 1998; 2001), Sandra Harding (1986), Lynn Hankinson Nelson (1990), Kai Nielsen (2001), Robert Neville (1981; 1989; 1992; 1995), J. Wentzel van Huyssteen (1999; forthcoming), Schrag (1992), and myself. I claim that Hefner belongs in this variegated company. This aspect of his thought, particularly his rootage in the complex tradition of Chicago empirical theology (Arnold 1966; Dorrien 2003, chaps. 3 and 4; Miller 1974; Peden 1987; Peden and Stone 1992), is often overlooked. My ap-

proach to Hefner is to analyze and appreciate him as one who draws upon the strengths of this Anglo-American approach, which avoids the overly simple dichotomy of the traditional Western and the extreme postmodernist paradigms.

The central concept of Philip Hefner's book *The Human Factor* is his theory of the created-co-creator: humans are the

> created co-creators whose purpose is to be the agency, acting in freedom, to birth the future that is most wholesome for the nature that has birthed us—the nature that is not only our own genetic heritage, but also the entire human community and the evolutionary and ecological reality in which and to which we belong. Exercising this agency is said to be God's will for humans. (Hefner 1993, 27)

I make three major claims in my analysis of Hefner: his theory of the created co-creator is (1) a sustained move beyond the traditional Western dichotomies, (2) involving falsifiable and tentative hypotheses which avoid the highest levels of abstraction. Although he is close to a foundationalist reliance on genetics and evolutionary theory, (3) his interplaying of science, myth, and theology finally refuses to privilege any one discourse and valorizes both myth and discursive language.

Moving beyond Traditional Dichotomies

My way of stating Hefner's overcoming of the traditional dichotomies of the Western paradigm is that he offers a strong triple thesis: (a) methodologically, science is an essential component for doing theology, (b) ontologically, there is a kinship between humans and the rest of creation, and (c) practically, the meaning and purpose of human existence is to fulfill the whole biosphere. I call this thesis strong because he has integrated the theological and scientific dimensions of his work in a tighter synthesis than almost any other theologian past or present. This has been a consistent thread throughout Hefner's writings. For him theology must "insist that science and religion are both essential to the whole truth of what is and what ought to be." Theology "must respect authentic manifestations of what is and what ought to be wherever they arise" (Hefner 1981, 74, 76).

Methodologically, theology is not on track, nor God rightly obeyed nor the spiritual life understood, unless we study the processes of nature and their future. Hefner finds that the question of God is relocated for contemporary persons in the question of the trustworthiness of the processes of inorganic and organic evolution.

> The new set of God-questions . . . moves the theologian inevitably toward "empirical theology," in the sense that it sets before him the imperative to deal with the data from the sciences—natural, physical, and social—and the humanities that throw light on the question of survival. It is difficult, for example, to see how theologians can any longer be ignorant of, let alone indifferent toward, the data of history, sociology, psychology, biology, astronomy, and other fields that pertain to the processes of the world, natural selection, the demands of personal interaction

and society, and the arts because it is in these areas that we see precisely what the nature and demands of the world processes are, as well as the evidence as to whether in fact these processes are trustworthy. These data are immensely rich, beyond the grasp of any single man, and open to contradictory interpretations, but that does not relieve the theologian of the responsibility to be both a well-informed student of these disciplines and also an active participant in the interpretation of their findings. (Hefner 1970, 17)

Ontologically, nature has a central place in Hefner's theology. Nature is a medium of both the knowledge of God and the grace of God. "Encounter with God takes place within the processes of nature" (Hefner 1993, 45). The evolutionary process, including the mechanism of natural selection, is God's process of bringing into being a creature who is a more complex phase of freedom. The evolutionary matrix is "the work of God to allow for the emergence of that which is necessary for the fulfillment of God's intentions" (p. 45). Our secular and religious traditions are ambiguous about the "nonnegotiable message of the sciences that we are part and parcel of nature" (p. 69). Some aspects of the Christian tradition, the doctrines of the Holy Spirit and the sacraments, for example, predispose us to accept this message, but they are balanced with aspects that speak dualistically of humans as different from nature.

This kinship of humans with the rest of creation is seen very clearly just at the point where the distinctiveness of humans is delineated. The biocultural sciences show us that humanity is composed of the nodal point of two information streams, the genetic and the cultural. "*Homo sapiens* is a two-natured creature, a symbiosis of genes and culture" (1993, 102). Indeed few theologians in my reading have studied so much evolutionary theory or integrated it so tightly into their theologies.

An implication of this emphasis on kinship with the natural is found in Hefner's treatment of freedom. Conditionedness and freedom have coevolved and constitute the evolutionary basis for morality. The evolution of the central nervous system brings in the biological basis of morality—choice, feedback, and response to feedback. The legacy bequeathed to us, our "capacities for thought-out action, interpretation, and justification," are part of being created and also co-creators (Hefner 1993, 100).

Finally the practical point is that the human purpose is to contribute further to the wholesomeness of natural processes. "The purposes for which God has intended the freedom and co-creatorhood of the human species pertain . . . to the entirety of the process of evolution and the terrestrial ecosystems. . . . Human culture is . . . a possible instrumentality for the fulfillment of the divine purposes for both humans and the rest of the created order on earth" (Hefner 1993, 48). Hefner suggests that this is the most far-reaching conclusion of his book in its rearrangement of the images that govern our perceptions. We often think of human purposes in terms of obedience to God's will or in terms of upbuilding the human community: love, justice, and so forth. But human fulfillment must be

defined within the larger framework of the natural order. "The direction God-ward leads us reflexively to nature" (Hefner 1993, 60). In technical terms, we need a noninstrumental valuation of nature. In theological terms, Jesus' life and death have intrinsic value, as do the elements of the communion service. This can be a model for our seeing intrinsic value in nature.

Our responsibility to the rest of nature is parallel to our responsibility to our children. We do not mold them to become what we want them to be, rather we contribute what will provide the greatest possibility for a wholesome future. "If nature is God's great project, then by devoting ourselves to its care and redemption we are pouring our resources into the same effort" (Hefner 1993, 74). Other creatures are more essential to the ecosphere than humans. Humans are unique in that they self-consciously make decisions that affect the rest of the ecosphere (Hefner 1993, 119).

Striving for a Middle Position

My second analytic claim about Hefner is that he seeks a middle position between a quest for certainty and epistemological nihilism by searching for tentative and falsifiable hypotheses.

One aspect of this is the hypothetical nature of religious convictions. Specifically, the Christian faith represents a body of information which, although it has the form of proclamation, of direct discourse, is an hypothesis to be tested (Hefner 1987, 40). In this respect the Christian faith parallels the information of myths generally. Myths contain a bundle of information which, although given in the form of declaration and command, are hypotheses to be tested (Hefner 1991, 126).

These hypotheses are serious attempts to say something about "the way things really are" (Hefner 1991, 133). Such attempts are fraught with risk. The God-question today has moved into "the realm of risk and uncertainty" (Hefner 1970, 16). In particular Hefner sees the question of God today as related to the questions of the trustworthiness of the evolutionary processes and of the survival of humanity. "The theologian must recognize that he is treading on questions whose answers could indeed demonstrate the non-existence of God and the error of his belief. If man in fact destroys himself by the violation of his physical and social environment, if he fails to survive, it will mean . . . either that there is no God or that the Christian tradition has not pictured him satisfactorily" (Hefner 1970, 16).

Hefner's concept of the testability of theological theories further illustrates his striving for a middle position, searching for the relatively reliable and tentative between the extremes of dogmatism and skepticism.

He draws heavily on the tradition of Karl Popper and even more of Imre Lakatos that a good theory needs to be falsifiable. Hefner's way of making this criterion flexible is that "*theory is a set of concepts that is capable of*

interpreting a range of phenomena. This set of concepts must meet satisfactorily two further criteria: first, *it must in principle be falsifiable, and second, it must be fruitful for stimulating further thinking and interpreting new data*" (Hefner 1993, 258). In clarifying this concept, Hefner adds,

> Obviously, theological statements do not aim at empirical content with the same degree of precision that scientific statements do, nor do they prize prediction in the way that scientific discourse does. . . . I suggest that theological statements . . . must be potentially falsifiable—that is, they must have a class of potential falsifiers that is not empty. How full that class is, is subject to variation, case by case. Theology's success in extending its explanatory field is directly correlated to how full or empty its class of potential falsifiers is. (Hefner 1993, 259)

In fact, "the final test of truth . . . may well elude . . . falsification." It is "critical that the import of any faith proposal be clear so that its significance can be assessed even if it is not easily tested" (Hefner 1993, 15). The theory of the created co-creator is "a candidate to be considered as theory . . . a hypothesis to be tested. . . . A theory cannot be demonstrated with finality or validated conclusively, even though it can be falsified. It is considered to be viable or useful as long as the attempts to falsify it (or test it) are productive for our understanding." We check to see if it possesses explanatory power, that is, gives us "comprehension of a large body of data that otherwise would be raw and uninterpreted" (Hefner 1993, 18).

"Christian faith does not ordinarily speak of its insights and their theological elaboration as theories to be tested or falsified. . . . To the human community at large, however, as well as to the reflective members of the believing community, even revelation is a theory to be tested" (Hefner 1993, 18). Hefner uses the concept of falsifiability to indicate that "theological theories should be referred to the world of possible experience and that it is desirable to discern what a proposed theory negates as well as what it affirms" (Hefner 1993, 24).

"The Lakatosian appeal to fruitfulness [is] . . . a welcome proposal for enabling public discussion of important issues" (Hefner 1993, 27). "Hypotheses in theology should . . . meet Popper's two criteria of falsification—that the acceptance or rejection of the hypotheses should be grounded in correlations with or deviations from knowledge drawn from the world of possible experience, and that the discussion of the adequacy or inadequacy of the theological hypothesis should be carried out in publicly available discourse" (1993, 28). Hefner speaks of testing hypotheses in a less than formal and rigorous way, as seeing if they make sense of what is known. It should be noted that the potential falsification involved in falsifiability need not involve conclusive falsification or knock-down arguments but can include the accumulation of counterevidence to the point of straining credulity.

In the Lakatosian approach a research program involves two types of methodological proposals: a "positive heuristic," which suggests new inter-

pretations or paths to pursue, and a "negative heuristic," which suggests potential falsifiers for the theory or paths of inquiry to avoid (Hefner 1988, 268).

POSITIVE HEURISTIC. Hefner claims that the positive heuristic of the created co-creator theory involves two sets of new interpretations: those concerning human experience in general and those concerning the Christian faith (Hefner 1988, 272–76). The first set includes five new interpretations:

1. the coadaptation of genes and culture in the symbiosis that makes us humans, including seeing religion as a transmitting agency for culture analogous to genes as transmitting agents, the possibility of religion promoting altruism beyond the kinship group, and the possibility of cooperation and peace replacing hostility and war
2. interpreting technological civilization within the context of the entire evolutionary process, so that the function of technological civilization is to stretch the evolutionary processes in new directions
3. relating freedom to its origin in the evolutionary processes
4. understanding natural selection as the instrument for producing the creature of freedom and culture
5. interpreting the purpose of human being as being the created (evolved) co-creator

The second set of interpretations concerns the Christian faith. The main new understanding here extends the claim that human existence occurs within the ambience of God's will so that both the evolutionary process and the realm of technology are seen in terms of ultimacy. In addition, several Christian doctrines receive new interpretations.

Christology. "Jesus Christ becomes the central event for understanding what it means for humans to be God's proposal for the future of the evolutionary process" (Hefner 1988, 274). Jesus' life is a proposal for the power and desirability of love, of trans-kin altruism as a new direction for the future of cultural evolution.

Sin. The concept of original sin witnesses to the discrepancy between what we formerly did in our evolution on the basis of preprogrammed genetic information and what we learn to do through culture. We cannot retreat to the prehuman past, but we do wish that "our culture would respond as immediately to the requirements of God's evolution as our prehuman nervous systems did. . . . The discrepancy between the instinct and the act and the unrelieved uncertainty which characterize the co-creator taint all that issues from human culture. The co-creating process thus becomes demonic on all too many occasions" (Hefner 1988, 275).

Redemption.

The reality of redemption is the fact that the artifacts of our co-creating are acceptable. . . . [N]othing is useless or unimportant for the work of God's evolutionary creation. The mutation and adaptation which appear to be "failures" are essential for the process. . . . The failures are no farther removed from the heart and soul of the evolutionary process than are the successes. . . . In the language of the cultus, this is expressed in the thought that our sacrifices are acceptable to the Lord, and they are united mystically with the sacrifice of Jesus Christ. (Hefner 1988, 275–76)

Evil. Drawing upon John Hick, Hefner maintains that evil often results from an evolutionary system. "Apparently, in order for freedom to emerge, creation must be such that a certain epistemic distance must be traversed by all individuals and groups. In our world, that traversing is according to the design of natural selection" (Hefner 1988, 276).

NEGATIVE HEURISTIC. The negative heuristic involves three sets of considerations.

1. *Hypotheses for which there clearly are potential falsifiers.* There are within this group, first of all, a set of empirically falsifiable hypotheses. These include hypotheses concerning *Homo sapiens* as a conjunction of genes and culture, hypotheses pertaining to cultural evolution and its role in trans-kin altruism, and the empirical components of the concepts of evolution, natural selection, freedom, and technological civilization. Second, there is a group of reinterpretations of classical Christian doctrines that may be tested with the conventional methods of theological analysis to see whether they are innovative to the point of discontinuity with the tradition.

2. *Positions which the co-creator theory forbids.* Among these are theories that separate humans from the evolutionary processes, separate the human being from technology, and separate technology from nature and the process of evolution; conceptions of God that separate God's purposes from evolution and technology; conceptions of redemption that view nature or the works of the co-creator as unimportant; concepts of the co-creator that underemphasize the co-creator as dependent on God or that do not appropriately articulate human autonomy; and concepts that suggest that human beings can create *ex nihilo.*

3. *The role of evil and theodicy as falsifiers.* The theory of the co-creator deals with evil by placing the theodicy problem in the hard core of the program, which is immune from falsification. This relies on two strategies: first, showing the validity of other aspects of the theory, and, second, emphasizing that answers to ultimate questions about the existence of God and the overcoming of evil are not capable of demonstration.

It is helpful to note that for Hefner the essence of testability is not predictive power but rather the drawing of specific implications on a lower level of abstraction to be subject to public scrutiny. This scrutiny can be to

determine the accuracy and adequacy of these implications or their usefulness in understanding an area of life. Testing can even be done by reference to an entire body of relevant scientific literature (Hefner 1993, 41, 42, 45, 48). "What is at stake in the falsification of theological theories" is whether in public scrutiny they "lead to interpretations of the world and of our experience in the world that are empirically credible and fruitful—that is, productive of new insights and research" (Hefner 1993, 261).

A fuller elaboration of Hefner's theory of falsification would involve his Lakatosian distinction between core and auxiliary hypotheses, it being the latter which are subject to falsification because lower in abstraction, more concrete, specific, and precise (Hefner 1988, 269). Hefner is quite clear about his core and auxiliary hypotheses (1988, 270–72; 1993, 32, 39–50). The hard core of Hefner's position, as he elaborates it, is the concept of the human as God's created co-creator (1988, 270; 1993, 32, 39). The protective auxiliary hypotheses include (1) the premise that *Homo sapiens* has two natures, coadapted symbionts, genetic and cultural, (2) the understanding of technological civilization as the phase of evolved existence in which all life on Earth is shaped by and dependent on the cultural artifacts that are the products of human decision and action, (3) the interpretation of cosmic, terrestrial, and biological evolution prior to *Home sapiens* as the instrumentality for the fashioning of freedom and the created co-creator, (4) the notion that freedom is nature's way of stretching itself toward newness, and (5) the classical Christian anthropology of sin and redemption, thus incorporating the first four hypotheses within Christian theology, thereby extending the interpretative significance of theology beyond the bounds of the Christian community.

In this entire discussion of testability, Hefner is constructing a middle position between a quest for certainty and a despair of finding any good reasons for theological affirmations. His remark concerning one hypothesis can stand for his view of them all. When these theories are subject to public scrutiny, "even though scientifically certain consensus may not be possible, not all such proposals are equally valid" (Hefner 1993, 41).

We have seen that Hefner's approach to testability of theories is an area where his search for relatively reliable, tentative theories seeks to avoid the choice between a quest for certainty and epistemological nihilism. Another area of search for the tentatively reliable is his study of myth and ritual, a key component of his view.

There are two levels of tentativeness here. The first level is that, even though "cultural information in the form of myth concerns that about which we cannot speak with certainty," it is necessary information (Hefner 1993, 186). Humans need to know whether the nature of reality is such that hard work and commitment make sense, whether love beyond the kinship group, which is costly and often not pleasurable, is justified on the grounds that is it commensurate with the fundamental character of reality.

Myths are information packets about the nature of reality. Underdetermination by the data is often cited as grounds for dismissing myth and ritual. However, in their early history "humans faced the necessity of acting on the basis of cultural information in circumstances that hardly allowed for hypothesis formation and testing" (Hefner 1993, 204). Myth provided precisely this kind of information. "Humans still require this kind of information about the nature of things, and they must act upon it even before they can gather data for demonstrating or falsifying it. . . . We cannot hold the behavioral consequences of myth and ritual in abeyance until such time as we have them recast in more credible intellectual form. Humans require the motivational dimensions as urgently as they need conceptual adequacy" (1993, 204–5). That such information is necessary for survival suggests that some of it, at least, has a degree of reliability.

Finally Hefner comes to the theological point that the love command is to be understood within the myth-ritual-praxis complex he has elaborated. "These questions call for intense consideration in the face of the obvious breakdown of our cultural motivators in the present time. The significance of the so-called religion-and-science field that has developed in this century lies in its recognition of these issues and its efforts to deal with them" (Hefner 1993, 205). At this point Hefner refers to Ian Barbour's *Religion in an Age of Science* (Barbour 1990). The influence of Ralph Burhoe (1981) may also be at work here. "Although the Hebrew-Christian concepts of love and the love command are relatively late arrivals in human history, they are to be understood within this myth-ritual-praxis complex of ideas, and their nature and function may thereby be illumined. The theological concepts of love are to be considered as elaboration of the myth and ritual complex" (Hefner 1993, 205–6).

The second level of tentativeness in Hefner's treatment of myth and ritual is that he develops his own discussion of myth and ritual by a detailed reference to several recent studies of prehistoric cave art. In recognizing the conceptual character of these interpretations he explicitly recognizes the tentative character of his own interpretation of this art.

Refusing to Privilege Any One Discourse

My third analytic claim is that while Hefner is not a foundationalist, for him science, especially genetics and evolutionary biology, is crucial in that it opens up "new vistas for understanding human existence" (Hefner 1993, 16). Unlike extreme antifoundationalism, Hefner gives science an important role in understanding humans.

It is not that "science determines what may or may not be believed religiously." Rather, whether a traditional religious symbol or formulation of a doctrine is enhanced or rendered obsolete when juxtaposed to science depends on whether that symbol renders significant human experience,

including science, adequately (Hefner 1993, 141). In short, what we need is scientifically informed religious discussion.

The role science plays for Hefner can be illustrated by his discussion of trans-kin altruism. "Humans face a distinctive evolutionary challenge. . . . [They] must live cooperatively in large communities of persons who are not kin relatives—that is, who are genetic competitors" (Hefner 1993, 198). Hefner focuses on the question formulated by E. O. Wilson, "How can altruism, which by definition reduces personal fitness, possibly evolve by natural selection?" He goes on to say, "From the first moment that I read Wilson, I felt that a religious tradition that centers on a man dying on a cross for the benefit of the whole world could not responsibly ignore a scientific discussion about the emergence within the evolutionary process of the possibility of living viably so as to put the welfare of others so high on the agenda that one creature would put its own welfare in jeopardy for the sake of others" (1993, 191).

Hefner's answer to Wilson's question is that the ancient myths and rituals that carry the cultural information packets for trans-kin altruism possess reliable information. Even though they are blatantly underdetermined by the data, can be subjected to reasonable processes of falsification only with difficulty, and even appear to be falsified in the light of contemporary science, they continue to serve the survival and flourishing of human communities. Indeed, even in secularized societies, the usefulness of myths and ritual, in modern as well as ancient forms, are far from being eliminated.

We should think of "a reciprocal impact, which consists both of mutual critique and possible reinforcement" between the myths and rituals of ancient information systems and scientific theories (Hefner 1993, 195). In fact, there are three modes of reflection appropriate to the study of trans-kin altruism: "the biocultural evolutionary sciences, the study of myth and ritual in human evolutionary history, and theology" (p. 196). Indeed, Part 4 of *The Human Factor* is a detailed elaboration of these three.

In light of this discussion, Hefner's postfoundational vision of the role of theology can be summarized thus: "Theology is motivated by its innate thrust to interpret reaches of experience that extend outside the formative events of the community of faith. . . . The created co-creator theory is intended to enable an extension of the explanatory power of Christian faith so as to provide genuine knowledge of wider human experience" (Hefner 1993, 258).

The interplay of science and theology means that no one discourse is privileged and both myth and discursive language are valued.

> Today, science and myth/ritual must function to . . . provide the information that will serve the natural order, and us humans within it, as it struggles under survival-threatening conditions. It is science that sets forth the fundamental descriptions of our human teleonomy, but it is myth and ritual that makes the basic proposals concerning the direction, meaning, and purpose of the structures and processes whose fulfillment shapes the form of human being. (Hefner 1993, 21)

We need both to trust "in the good sense of myth and ritual, on their own terms, and also in our good sense to appropriate or reject them critically" (p. 216).

In summary, Hefner's theory of the created co-creator is intertwined with the biological theory of evolution at its core and involves falsifiable and tentative hypotheses that avoid the highest level of abstraction. Although he is close to a foundationalist reliance on genetics and evolutionary theory in general, his interplaying of science, myth, and theology finally refuses to privilege any one discourse and valorizes both myth and discursive language. In all of these respects he is a representative, in his own fashion, of an alternative paradigm to both the typical Western tradition, including its modernist versions, and most versions of postmodernism. His rootage in the Chicago tradition of theology, including Joseph Sittler (1961) and Bernard Meland (1988), if we were to trace this, would place his intellectual genealogy within what I have described as the Anglo-American alternative to the modernist/postmodernist divide. (For Meland see also Inbody 1995; Stone 1995.)

Hefner in Focus

The significance of Hefner's thought can become clearer by contrasting it with that of two other contemporary theologians, George Lindbeck and Mark C. Taylor.

George Lindbeck. Yale theologian Lindbeck sets up a false dichotomy between the intra- and extrasemiotic references of language, allowing him to downplay the reference of religious language beyond itself. He also has a false split between "inner" experience and cultural symbols.

In *The Nature of Doctrine* (1984) Lindbeck tries to develop and defend a cultural-linguistic theory of religion and doctrine in which doctrines are seen as primarily second-order statements—as regulations or rules governing (but not specifying) religious affirmations. He proposes this theory as an alternative to the traditional theory, in which religious language is basically propositional, and to the liberal's experiential-expressive theory, in which doctrines are expressive symbols of an inner religious experience.

According to this cultural-linguistic theory, religions are "comprehensive interpretive schemes, usually embedded in myths or narratives and heavily ritualized, which structure human experience and understanding of self and world" and which are used for the intention of "identifying and describing what is taken to be 'more important than anything else in the universe' and to organize all of life, including both behavior and beliefs, in relation to this." To become religious, on this view, is to interiorize a set of skills by training and practice. To put it slightly differently, a religion is "a communal phenomenon shaping the subjectivities of the individual, not a manifestation of them" (Lindbeck 1984, 33).

A key issue for Lindbeck is whether religion should be seen as the product of the experience of the divine (the experiential-expressive theory) or whether, as he claims, religion produces the experience (1984, 30). Lindbeck briefly grants that there is a reciprocity between "inner" experience and "external" religious and cultural factors and claims merely to stress the latter as the primary factor (1984, 33–34). However, in developing the thesis he drops the interplay between the "inner" experience and the communal-linguistic network of symbols and instead lays exclusive emphasis on the social network. Because symbol systems are primary, there is no experience without interpretation. It is not necessary to use the hypothesis of private experience in order to understand religion (1984, 36–37).

In Lindbeck's theory, religious language is intratextual or intrasemiotic—that is, a second-order language. It says nothing either true or false about the object of religious language (1984, 68–69). The best theory of the Trinity, for example, is not the one that corresponds with the real nature of God. No one can answer that question. Rather it is the one that best organizes the data of scripture and traditions with a view to its use in worship and life. In other words, for Lindbeck confirmation and rejection of religious assertions occurs through the accumulation of successes or failures in making coherent sense of relevant textual data.

Now, from my perspective, when we see the false dichotomy between the modern and the postmodern paradigms (or, better, extreme versions of them), Lindbeck falls into this trap. He has made a dichotomy between inner experience and outer religious and cultural factors. A more adequate approach would maintain that there is an interplay between these factors, between the social network of symbolized experience and the individual creative use of it in explaining one's own experience. By not recognizing the transactions between symbols and the world, Lindbeck has left no room for the exploration of the world through a disciplined and open sensitive discernment.

Lindbeck assumes the near-isolation of communities of tradition and their grammar of faith and practice. Hefner, on the other hand, stresses the dialogic nature of disciplines and communities, especially theology and the sciences, and the partial commensurability of the grammars of overlapping communities. At this point he is closer to Burhoe (1981) and Karl Peters (2002), his dialogue partners over the years, as well as such thinkers as Michael Cavanaugh (1996), Niels Henrik Gregersen (1998; 2003), Arthur Peacocke (1984), John Polkinghorne (1994; 1998), Gerd Theissen (1979; 1984), and J. Wentzel van Huyssteen (1999; forthcoming). This is especially clear in van Huyssteen's 2004 Gifford Lectures. If one can speak of such matters, Hefner is rooted more in the Chicago than in the New Haven theological orbit. This comes out when the data of theological inquiry are specified. For Lindbeck the data are the texts (and, to perhaps a lesser extent, theology being an intellectual discipline, the rituals and

practices) of the Bible and the church traditions. For Hefner the data of theology include the well-established theories and the worldviews of the sciences, held in creative tension with the Christian tradition.

Mark C. Taylor. In the 1980s this radical theologian developed what he calls an "a/theology," in which he attempts to reflect on religious issues after the "death of God," of which so much was said at the end of the 1960s. Taylor seems to have taken as his starting point the position of Dostoevsky's Ivan Karamazov that without God everything is permitted. The trouble is that Taylor does not seem to have examined the dichotomy involved here, that either God exists or everything is permitted. Without God (Hefner might add, "as traditionally conceived"), *is* everything permitted?

In his postmodern a/theology, Taylor's argument assumes a dichotomy between the so-called ontotheological perspective, from Augustine to Hegel, and a postmodern viewpoint which moves to the opposite extreme. Taylor deconstructs the former notion and is left with the opposite alternative. As often happens with dichotomies, this one turns out to be false. More choices are available than the two considered. There is, for example, an entire range of options clustered around both the process viewpoints and the related positions of radical empiricism. It is surprising that Taylor does not consider these options, since he delineates a process-relational view in chapters 3 and 4 of *Deconstructing Theology* (Taylor 1982, 45–85). The point is that there are alternatives to both the ontotheological tradition, which he rightly rejects, and the extreme a/theological view he espouses.

Taylor starts with a rejection of classical theism. He identifies the God of classical theism as the transcendent and eternal First Cause. "According to the tenets of classical theism, God, who is One, is the supreme Creator, who through the mediation of His divine Logos, brings the world into being and providentially directs its course. This Primal Origin (First Cause or *Arche*) is also the Ultimate End (Final Goal or *Telos*) of the world" (Taylor 1984, 7).

Taylor bases his view of traditional ontotheology on what he sees as the main Christian dualism, or dyad, which results in the suppression of one term of the dyad by the other.

> Most of the Christian theological network rests on a dyadic foundation that sets seemingly exclusive opposites over against each other. Furthermore, these paired opposites form a hierarchy in which one term governs, rules, dominates, or represses the other. For example, God governs the world, eternity and permanence are more valuable than time and change, presence is preferable to absence, spirit more worthy than body, etc. The grounding principle of this exclusive network is an abstract notion of identity, difference and non-contradiction. (Taylor 1984, 108–9)

Taylor seeks to contrast this dyadic hierarchy (the ontotheological) with a free-playing, multivalent erring (the a/theological). The problem with Taylor's view is that there are a great many religious options available be-

sides the ontotheological and a/theological. We can see this if we pursue the development of his thought in four main sections in his book *Erring* (1984). These sections each take the form, first, of a dichotomy, and then the rejection of the historically older alternative.

Taylor's first dichotomy is between God as the absolute Author/Creator/Master of ontotheology and the view with which he identifies, the God incarnate of a/theology inscribed in writing which errs in an unending play of interpretations which marks the death of God in an eternal kenosis (Taylor 1984, 19–33, 97–120). His second dichotomy is between the idea of the sovereign self made in the image of the self-identical, self-conscious, absolute God as Master and his own option, the notion of the self as an erratic trace, a generous communicant, able to take delight without possessiveness (1984, 34–51, 121–48). The third is between history as a linear, logocentric, imaginative construction, an attempt to deny death and overcome the despair of the unhappy conscience (a reference to Hegel's *Phenomenology of Spirit* [1977]) over the opposition between "reality" and "ideality," and history as an endless erring, willing to affirm the real and breaking the power of the ideal, a purposeless erring that breaks the psychology of mastery and the economy of domination by spending generously. Erring, which is Taylor's preferred stance, is beyond good and evil, affirming the stance, or orientation, of what he calls "carnival" (1984, 52–73, 149–69). Taylor's fourth dichotomy appears in his theory of meaning. Taylor rejects what he refers to as "the book," a typical product of Western civilization in the past few centuries. He rejects "the book" as an ordered, logocentric totality, the author of which limits the proliferation of meanings, and rejects truth as unified, singular, simple and abiding. The alternative is "writing" as incessant erring, forever vague, without a foundation to anchor its proper meaning. The task of interpretation is not to discover the true meaning of something but to produce new ones (1984, 151).

Taylor affirms that axiological transcendence, the separation of the ideal and reality that accompanies traditional theism, results in perpetual discontent and furthermore is a sign of a hatred of all that perishes.

> The quest for truth represents a futile attempt to escape the world of appearances and to discover (or uncover) the fugitive transcendental signified. In spite of protests to the contrary, this pursuit is never disinterested. "The will to truth" simultaneously expresses "hatred for all that perishes, changes, varies" and gives voice to a longing "for a world of the constant." (Taylor 1984, 176)

This is to accept Nietzsche's view of Platonic transcendence uncritically. A will to truth is not necessarily a hatred of the perishing. It is a longing to understand it and perhaps to love it more fully. Here again Taylor sets up a false dichotomy, this time between love and hate. But are there not some things worth transforming? Are ignorance, prejudice, disease, and hatred worth contending with, despite the possibility of imperial arrogance in the

struggle? While being worldly, must we wallow in everything? To love the finite does not mean to accept it without change. Taylor thinks that suppression is worth struggling against. If so, that is one major finite thing that is unacceptable. Therefore we cannot simply accept the finite. Between toleration of everything including evil and the rejection of all things except one's parochial notions lies a vast range of options where we must exercise responsible decisions.

Perhaps it is not too much of a simplification to say that Lindbeck represents the conservative and Taylor the radical possibilities of theological postmodernism. Lindbeck's postmodernism follows the linguistic turn and assumes the near isolation of language games. Taylor's postmodernism is that of a reaction against the theistic foundation and metanarrative of Christendom in the name of freedom and what Taylor calls *jouissance* and which might be translated as "joy." Hefner's conversational stance across the divides of world perspectives and disciplines attempts to overcome the isolation of language games from each other and the corrective of experience (for Hefner experience is understood more as interpreted by empirical science than as experience of the ultimate, though this should not be overstressed). In contrast to these other two, Hefner is more of a reformer, neither accepting nor rejecting the Christian grammar but revising and at the same time strengthening.

Conclusion

Hefner belongs in the number of those who do not buy into a simple dichotomy that sets postmodernism against modernism (which, ironically, perpetuates the dichotomous thinking of the Western paradigm). We have in Hefner the edifying spectacle of a Christian theologian who takes science seriously and who values and encourages empirical inquiry.

To investigate how much of this is a result of his Chicago training, particularly the influence of Meland and Sittler, as opposed to the education of Lindbeck or Taylor, would take us beyond our present topic. However, such a genealogical investigation into the particularities of historical influence, much as it might play into the hands of those who view intellectual history as a network of contingent and particular filiations, would overlook two things. One is that each of us must be responsible for what we make out of the particular contingencies of our situation. We need not stay in our intellectual hometowns all of our lives. The other is that, as a Christian theologian, Hefner takes seriously the Christian claim that God is the Creator and Christ the Logos of all creation, so that theology includes among its tasks an exploration of the world through scientific and other modes of inquiry, coupled with theological reflection on this exploration, not a defense against the invasion of secular modes of thought. It is this sense of exploration, rooted in the affirmations of his Christian faith,

rather than the contingencies of his education, that is the basis for his lifelong generous encouragement of the religion-and-science dialogue as well as for his own contribution to this conversation.

NOTES

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1. The following section is adapted from Stone 1992, 139–42, 210–14.

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AN EVOLUTIONARY CRITIQUE OF THE CREATED CO-CREATOR CONCEPT

by William Irons

Abstract. The created co-creator theology states that human beings have the purpose of creating the most wholesome future possible for our species and the global ecosystem. I evaluate the human aspect of this theology by asking whether it is possible for human beings to do this. Do we have sufficient knowledge? Can we be motivated to do what is necessary to create a wholesome future for ourselves and our planet? We do not at present have sufficient knowledge, but there is reason to believe that with further scientific research we will be able to acquire it. The more difficult question is whether we can be motivated to cooperate on the scale necessary to fulfill this purpose. Evolutionary theories of human sociality, altruism, and cooperation are reviewed. I conclude that it is possible for human beings to fulfill the purpose defined for us by the created co-creator concept, but doing this will not be easy.

Keywords: altruism; behavioral ecology; cooperation; created co-creator; evolutionary psychology; game theory analyses of human cooperation.

The core of Philip Hefner's theology of the created co-creator is this:

> Human beings are God's created co-creators whose purpose is to be the agency, acting in freedom, to birth the future that is most wholesome for the nature that has birthed us—the nature that is not only our own genetic heritage, but also the entire human community and the evolutionary and ecological reality in which and to which we belong. Exercising this agency is said to be God's will for humans. (Hefner 1993, 27)

This is a theological statement, not a scientific one, but in my opinion it represents scientifically informed theology. Because it is theology, and I

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am offering a critique as a scientist, I cannot criticize the entire proposition, only the part that is subject to scientific evaluation. I focus on what science tells us about the potential for human altruism and cooperation. The idea that there is a creator God who gave human beings a purpose may be correct, but it cannot be evaluated scientifically by looking for a correspondence between theoretical models and systematic empirical observation. However, one aspect of the concept can be investigated scientifically. This is the proposition that human beings can create a future that is wholesome for the human population of the world and the ecosystem of the planet on which this population depends. Note the slight modification I have made: I ask about a wholesome rather than the "most wholesome" future. This is a less demanding proposition to evaluate but raises the same questions.

We have a growing body of knowledge as a result of evolutionary sciences such as human behavioral ecology and evolutionary psychology. This knowledge suggests that it is possible for human beings to create a wholesome future but that it will not be easy. There is definitely no guarantee that it will happen.

Whether human beings *can* do this and whether we *should* are also, to a degree, separate questions, and the second question, like all such basic ethical questions, cannot be answered completely by science. Hefner answers this second question by drawing on a tradition of Christian theology. I as a nontheist can respect his answer, but for myself I need a somewhat different justification. Following Richard Alexander (1987), I see moral propositions as being based on a consensus or near consensus among the members (or at least the most powerful and influential members) of a society. In this case, saying that human beings should take as our purpose creating a wholesome future is something that would require the near agreement of most of the human populations—or at least most of the governments—of the world. This is asking a lot, but I believe that it may be possible. There have been movements in recent history toward international cooperation that support this possibility. These include the acceptance by many governments of various agreements relating to the long-term protection of the environment and certain treaties protecting human rights throughout the world. There are not yet enough of these international accords with sufficient means of enforcement to inspire great confidence, but the mere fact that such accords have enjoyed some success is, in my opinion, grounds for hope. It will not matter if this near consensus is based for different people on different theological traditions, some Christian, some representing other religious traditions, and some based on purely secular humanistic traditions. As long as there is sufficient agreement on the human course of action required, the proposal can be realized.

The human aspect of the created co-creator proposal can be broken down into several smaller questions. First is the question of the level of

social group in which the created co-creator is to do the work of contributing to the creation of a wholesome future. Another is the question of how wholesomeness is to be defined. We also must ask whether human beings have sufficient knowledge to act in ways that will create a wholesome future and whether we can be motivated to act on this knowledge. Being motivated to create a wholesome future may require a large measure of altruism and cooperation, and current evolutionary theory raises questions about the extent to which people can be motivated to behave altruistically or cooperatively. This question of human motivation is the most serious scientific challenge to the created co-creator theology and the question to which I give the most attention.

Concerning the level of social group, I begin by saying that the larger the social group the more difficult it is to establish cooperation. Much of the way in which Hefner discusses his idea implies a concern for the preservation of the global ecosystem on which the human species depends for survival. This requires international cooperation. It is tempting, once that is said, to conclude that the situation is hopeless. However, I alluded to signs of a recent historical trend toward greater international cooperation. This is a halting trend represented by such events as the creation of the United Nations and of the European Economic Community. Creating a wholesome future for our species will require more international cooperation than these organizations have accomplished so far, but there are grounds for hope. I address the possibility of putting the created co-creator idea into practice at this highest level of international cooperation and then comment on how it can be applied at more local levels.

There is also the question of the definition of wholesomeness. Achieving a consensus definition would be very difficult. For now I think it suffices to say that most of us can identify conditions of future environments that we would say are wholesome and other conditions that we would say are unwholesome. Persons with different cultural traditions are almost certain to define this concept differently, but such disagreements may not be great enough to bar cooperation.

Hefner raises the question of how human beings will use future knowledge of genetics in a wholesome way. In addition to managing the global ecosystem, there will be the question of managing the human genome.

There also are questions of social justice and war that seem intractable. Again, I think that a complete elimination of the problems that come under this heading is out of the question for the foreseeable future, but there is hope that in the longer run the condition of the world's human community may move toward improvement in these areas as well.

Do human beings have sufficient understanding of ourselves and our ecosystem to create a wholesome future? Can we be motivated to act on this knowledge and actually create a wholesome future? I address these two questions separately. The more troublesome question, in my opinion,

is the issue of motivation. As already noted, this requires a measure of altruism, and evolutionary theory is not crystal clear on the question of how much altruism we can hope for. I argue that there is hope that human beings can create and use what game theorists call win/win or nonzero-sum situations in order to motivate cooperation despite our basic selfishness (cf. Ostrom 1990; Ridley 1996; Wright 2000).

Sufficient Knowledge?

Do human beings possess sufficient understanding of our genetic heritage and basic nature, and of the nature of the ecosystem on which we depend for our survival, to fashion courses of action that will preserve a healthy ecosystem for future populations? My tentative answer to this question is that we do not at present, but we are close enough that we can be hopeful about this aspect of the created co-creator proposal. The controversy set off by Bjørn Lomborg's book *The Skeptical Environmentalist* (2001), I believe, makes it clear that our knowledge of how to manage the global ecosystem is incomplete and that resolving the unanswered questions is made difficult by politicization of environmental issues. Nevertheless, I believe that more research and continuous monitoring of crucial ecological parameters will make this possible. To have sufficient knowledge we need to know how much biodiversity must be maintained. We need to know how large a human population the world can support on an indefinite basis. We also need to recognize that what is considered sufficient knowledge and what is a sufficiently wholesome environment are, in effect, moving targets. Perhaps the most important thing to observe is that the theology of the created co-creator calls for efforts to increase knowledge of our species and of the world's ecosystem. Both research to gain new knowledge and education to spread this knowledge are necessary parts of the program of the created co-creator.

Fuller understanding of the human genome will allow health measures that are not possible at present. Will these include some modification of the genome? Will such changes make future environments more wholesome? The latter is a subject that excites strong reactions, but we need to keep an open mind as our knowledge increases. Such a thing may be seen as desirable by future generations. Will a better understanding of the interconnected populations and other forces that constitute our global ecosystem enable us to do a better job of protecting this ecosystem? The answer of course is yes, but what this future knowledge will be and what course of action it will justify are questions we cannot now answer completely.

The question of war and social justice is, if anything, the one that inspires the least optimism. In recent history we have witnessed a number of genocides, and in many parts of the world lesser but nevertheless serious violations of human rights still abound. Wars also persist, and terrorism

has greatly complicated the question of how to move toward a world characterized by less war and more peaceful international cooperation.

The most hostile force of nature for members of our species during most of human evolution has been other human beings (Alexander 1987). War and destructive exploitation of natural resources are immediate causes of much of what we can label as unwholesome in the contemporary world. Knowledge, including the kinds of knowledge produced by the social sciences, can aid in abating and eliminating these threats to human welfare, but the question of what people can be motivated to do also is relevant to solving problems caused by human destructiveness. This provides a transition to the more difficult question of human motivation.

Can Humans Be Motivated to Create a Wholesome Future?

Evolutionary psychology and behavioral ecology are associated with the idea that human beings and other organisms can be motivated to behave altruistically only under certain conditions (Dawkins 1989) and also with the idea that it is especially difficult to motivate humans to be altruistic to strangers or to act in ways that cost us and produce benefits that are diffused among a very large population. It might seem, therefore, that the answer to our question is a definite no. However, this is not unambiguously the case. Numerous recent developments in the theory of the evolutionary basis of human altruism suggest ways in which it may, in fact, be possible to create a social environment in which we can be motivated to behave in ways that are beneficial to the human populations and ecosystem of the future. This can best be done by a combination of social strategies that include monitoring, punishing certain selfish behaviors, and creating social structures that entail win/win situations (Ostrom 1990; Ridley 1996; Wright 2000).

It is an empirical fact that human beings form social groups of great size and that maintaining these groups requires a measure of cooperation among group members. These groups are much larger than can be explained by kin altruism or direct reciprocity. This has led to the development and, to some extent, testing of theoretical concepts that can explain larger cooperating groups. Primary among these concepts are indirect reciprocity (Alexander 1987), the game theory concept of commitment (Schelling 1960; Frank 1988; Hirschleifer 1987; Nesse 2001a), and game theory ideas about the use of punishments to enforce cooperation (Boyd and Richerson 1992; Bowles and Gintis 2002; Fehr and Gächter 2000). Also, a complete model of how human beings manage to form large cooperating groups needs to include the fact that large human groups are built around political hierarchies that use coercion to assure cooperation. Behavioral ecologists and evolutionary psychologists have not really begun to explore the role of

hierarchies in maintaining large human social groups, but other social scientists have, and we can draw on their knowledge to build better models of human cooperation. In what follows I review the various social strategies on which human altruism and cooperation are built.

Indirect Reciprocity

Indirect reciprocity can be summarized with the behavioral rule that says, Be nice to nice people and nasty to nasty people. Indirect reciprocity occurs when people observe other people and then behave altruistically toward those who seem to be altruistic and selfishly toward those who seem to behave selfishly. This involves the notion of reputation. In the small human communities of our ancestors, individuals had extensive opportunities to observe the behavior of others, and over time people acquired reputations based on what was observed. People then rewarded those who were generally helpful to others by giving them aid and punished those who were not helpful by refusing to help them. According to Alexander (1987), this sort of indirect reciprocity formed the basis of human morality, and the psychological tendency to behave in this way was favored by natural selection because it facilitated the formation of larger, better-united groups. In human evolution, group-group competition became a powerful selective force, and there was runaway selection for a number of traits that aided the formation of larger, more solidary groups. According to Alexander, moral systems are systems of indirect reciprocity. Game theory simulations of indirect reciprocity have supported the idea that such systems can in fact serve as the basis of cooperation among groups of genetically unrelated individuals (Nowak and Sigmund 1998).

Below I review a number of additional social strategies—commitment, moralistic strategies, altruistic punishments, and hierarchies of power—that can extend the size of cooperative human groups. All of these strategies with the exception of hierarchy are elaborations on the theme of indirect reciprocity. The basic idea of indirect reciprocity consists of observing the behavior of others and then rewarding cooperative behavior and punishing uncooperative behavior. In a social environment in which indirect reciprocity is an important strategy, it would pay individuals not just to passively wait for other members of their group to discover that they are "nice" people but rather to actively send out signals of their niceness. It would make sense to signal other socially useful qualities as well. Thus, theories of signaling and related theories about commitment are a straightforward extension of the idea of indirect reciprocity. In a similar way, moralistic strategies and altruistic punishment are elaborations of the basic strategy of indirect reciprocity.

Social environments based on indirect reciprocity are vulnerable to deception and freeloading. Despite this, human sociality has reached an impressive scale. This is because there are counterstrategies that limit the

extent to which freeloaders sending false signals of cooperative intentions can undermine cooperation. Such strategies include hard-to-fake signals of commitment and punishments.

Commitment

The game theory analysis of commitment and signals of commitment began with work by Thomas Schelling (1960) and has been expanded by a number of later theoreticians (Hirschleifer 1987; Frank 1988; Nesse 2001b). Schelling (2001, 52–53) has used material from Joseph Conrad's *The Secret Agent* (1923) to illustrate the strategic use of commitments. In the novel, anarchists who were plotting to blow up Greenwich Observatory were known to get the nitroglycerine they needed from a man referred to only as the Professor. The police knew about the Professor's practice of supplying anarchists with nitroglycerine but did not try to apprehend him because he was believed to carry some nitroglycerine in his jacket connected to a releasing device in his pocket. The police believed that if they tried to apprehend him, he would blow himself and them to bits. Because of this belief, they never tried to arrest him or charge him with a crime. Thus, by making a contingent commitment to do something contrary to his self-interest, the Professor served his self-interest. Blowing up himself and the police would have been very much contrary to his self-interest, but because the police believed he was really committed, he never had to act on this commitment.

The story of the Professor is not a very inspiring one if we are looking for hope that human beings can create a wholesome future. A better example can be found in President John Kennedy's political decisions during the Cuban missile crisis. The Russians were installing missiles in Cuba, with Cuban cooperation. These missiles could target American cities with nuclear warheads. Kennedy responded by quarantining Cuba and threatening to stop any Russian ships carrying missiles to the island. The risk that a confrontation between Americans and Russians could escalate into a nuclear war was great. A nuclear war would be contrary to the interests of both the American and the Russians. In effect, each side was playing the game of chicken. In a game of this sort, the more committed party has the advantage (Schelling 1960). Apparently the Russians were convinced that Kennedy would stop their ships despite this risk, and they backed down. Here again an inflexible but contingent commitment to behave contrary to self-interest served a useful purpose. It persuaded the Russian government to do what the American government wanted.

A contingent commitment to act contrary to self-interest can be a powerful instrument. This kind of strategic commitment is inherently neither good nor bad; it is simply inherently powerful. It can be used for good or bad purposes. In terms of creating future environments, such commitments could be used to create a better future or a worse one. The hope

associated with the created co-creator theology is that commitment will be used to create a better, more wholesome, future.

Numerous other illustrations of commitment can be offered, and not all involve violence or destructive behavior. Marriage and business contracts are examples of commitment. Jack Hirschleifer (1987) and Robert Frank (1988) suggest that human emotions are forms of commitment and that their visible signs are credible signals of commitment. They further suggest that these emotions evolved because of the advantage they conferred on individuals who could influence others with their commitments. Love and anger can easily be seen as emotions that commit us to courses of action that persuade others to behave in ways that serve our interests. In the formation of large cooperating groups, patriotic commitments to nations or commitments to adhere to the precepts of a particular religion can serve as means of creating cooperation.

Ideas about commitment derived from game theory are very similar to the ideas that have been developed by evolutionary biologists focused on the study of signaling in animal behavior (Zahavi 1975; Maynard Smith and Harper 2003). The game theorists have emphasized that hard-to-fake signs of commitment play an important role in the use of commitment as a social strategy. Obviously a commitment is not going to influence behavior if it is not communicated to someone else. A reliable sign of commitment is therefore as important as the commitment itself. Especially important are what game theorists call hard-to-fake signals of commitment. There are numerous reasons why a sign or signal can be hard to fake. It can be difficult or at least unprofitable to fake because it is secured, because it is costly, or because it is easily monitored.

An example of a commitment secured by contract is an apartment lease, which requires a security deposit and contains a clause saying that the renter will forfeit the deposit if she breaks the lease before it expires. An example of a commitment secured by circumstances would be an army that is committed not to retreat because there is a large cliff to its rear. Schelling (2001, 48) quotes Xenophon as saying that the ideal setting for battle is one in which the enemy see easy retreat in every direction, while one's own army has a ravine to its rear and can find no safety other than in victory.

Commitments do not need these sorts of visible backing to be persuasive. Signals are more reliable the costlier they are and the more easily they are monitored. Consider the case of a social group in which the members of the group frequently help one another. Giving help is costly, but receiving help is a benefit, and the benefits of membership more than compensate for the costs. Assume that the members also monitor each other and expel individuals who are found not to do their share of helping. A freeloader may wish to enter such a group and enjoy the benefits without paying the costs, but he or she will be discovered and thrown out. The freeloader could then move on to another similar group. The altruism of

such groups can be parasitized by mobile freeloaders. However, if entering the group is allowed only after one does something costly such as putting up with a period of hazing or paying a large sum of money, the freeloader's chances of recouping the costs of entrance before being discovered and ejected are slim. In a situation like this, requiring a costly signal of group membership can prevent freeloading.

It has been suggested that religions and religious rituals have served as hard-to-fake signals of commitment in ancestral human environments and that our propensity to be religious is an evolved trait for this reason. Practicing a religion often entails considerable cost, and thus religion can serve as a hard-to-fake signal of commitment to a particular social group (Cronk 1994; Iannaccone 1992; Irons 1996; 2001a, b). Religious rituals also meet the easy-to-monitor criterion because of the large number of often elaborate public rituals that most religions require (Irons 1996; 2001a, b). Practicing a religion is a hard-to-fake signal of group loyalty because it is both costly and easily monitored.

The hypothesis that the psychological mechanisms underlying religion are evolved adaptations with the function of enhancing within-group cooperation has been tested by Richard Sosis, who compared the longevity of religious versus secular United States communes in the nineteenth and early twentieth centuries. He found that communes with a religious charter last on average four times as long as those based on secular charters (Sosis 2000; 2003; Sosis and Alcorta 2003; Sosis and Bressler 2003; Sosis and Ruffle 2003). Sosis and his colleagues have just begun their very impressive research on the evolutionary foundations of religion. It would be premature to claim that they have proved that religion is a hard-to-fake signal of commitment. More research is necessary to evaluate this hypothesis thoroughly. Nevertheless, their findings are very suggestive, showing that for some reason religious commitments are more effective at creating cooperation than those based on a secular ideology and that religion may have an important role to play in creating larger-scale cooperation in the future. However, this statement is not without ambiguity. Religions of the fundamentalist variety can serve as sources of very destructive behaviors (Almond, Appleby, and Sivan 2003). On the other hand, the more liberal forms of religion that have led to the formation of various interfaith groups such as the Parliament of the World's Religions may offer hope for religious institutions that encourage the kind of behavior advocated by the concept of the created co-creator.

Punishments

Robert Boyd and Peter J. Richerson (1992) used simulations to demonstrate that conformity to costly social norms can be enforced by what they call moralistic strategies. These strategies consist of two parts: punishing those who do not obey some social rule, and punishing those who do not

punish rule breakers. Moralistic strategies are clever extensions of indirect reciprocity. It is not hard to find real examples of social strategies that contain the central elements of this model, the elements of punishing rule breakers and of punishing non-punishers. The McCarthyism of the early 1950s is one conspicuous example. (Although named for Senator Joseph R. McCarthy, the term characterizes practices that began earlier, survived later, and flourished in both houses of Congress as well as state legislatures.) Individuals were punished for being members of the Communist Party USA or its front organizations by being put on blacklists that kept them from getting jobs. The results were devastating for some who were closed out of professions in which they had been successful for years. Also, persons known or thought to be Communist were called to testify in committee hearings and asked to give up the names of others whom they knew to be Communists. If they gave some testimony but refused to give names, they could be jailed for contempt. Thus, they were not only punished themselves but were also required to, in effect, punish others. To invoke the Fifth Amendment was to invite public suspicion.

A similar kind of moralistic strategy with even more dangerous consequences is visible in the conflict between Israel and Palestine. Many Arab leaders who were "soft" on Israel have been assassinated in the bloody history of the conflict. Thus, Arab hard-liners not only punish Israel by maintaining an aggressive stance toward Israel but also punish those who fail to punish Israel—those who are "soft" on Israel. This has the unfortunate effect of pushing moderates seeking peace into the closet when conflict between these groups is violent.

A recent set of experiments by evolutionary economists and game theorists has explored another way in which punishments can be used to maintain cooperation. Their experiments revolve around what they call altruistic punishments (Fehr and Gächter 2000; Gintis 2000). The experimenters have volunteers play a game something like the following. Players are given a certain amount of money—say, $100 each—from which they can make contributions to a public-goods fund. What they do not contribute to the fund, they can keep. After all players have been given a chance to contribute to the public-goods fund, the fund is then increased by some multiple—say, doubled—and then the money in the fund is divided evenly among all the players, whether they contributed or not. If every player contributes her entire $100, and the fund is doubled and then divided evenly, each player gets $200. This is much better than simply keeping the $100 each was given initially. However, if there are four players, and three contribute $100 and one contributes nothing, the outcome is different. When this round of play is over, those who gave $100 to the public-goods fund each get $150 when the fund is distributed. The freeloader who kept his $100 also gets $150 when the fund is divided and ends up with $250. Freeloading pays more than contributing.

If the game is played several times, the contributions to the public-goods fund tend to decline as the contributing players realize that they are being taken advantage of by freeloaders. However, if an additional rule is added allowing players to know what other players contribute and to punish those who contribute too little, contributions to the public-goods fund can be maintained over extended play. The ability to punish may take the form of allowing a player to pay, say, $20 to have $100 taken away from another player whom she designates, or $40 to have $200 taken away. However, the person who pays to punish gets no automatic payback, only the satisfaction of punishing a freeloader and perhaps the hope that future payouts from the public-goods fund will be large for everyone.

Given this ability to punish, the usual result is for the public-goods fund to remain large or even to grow somewhat. Such games reveal that human beings have a strong motivation to punish others whom they see as free riders, even if it costs them to do so. If their punishment causes freeloaders to start contributing to a public-goods fund, the benefits of their punishment are shared equally among all players. In this situation, punishing imposes a net cost on punishers that is not recouped and is therefore altruistic. This propensity may be an evolved adaptation that served in human evolution to maintain cooperation in non-kin groups. Altruistic punishments are a form of the basic strategy of indirect reciprocity, be nice to nice people and nasty to nasty people. Here altruistic punishers are nasty to nasty people at a net cost to themselves.

Ernst Fehr and Simon Gächter (2000) refer to the type of altruisms their research reveals as strong reciprocity and argue that it can be maintained in a population only by group selection. They usually refer to this as multilevel selection. David Sloan Wilson (2002) also has made strong arguments for the role of group selection in understanding human altruism and has tied this to his idea that religious congregations and communities as social groups are products of group selection. Boyd and Richerson (2001) have made a somewhat similar argument in favor of what they call cultural group selection. This consists of the differential survival of cultures—that is, cultures that encourage greater altruism are more likely to survive. From the 1960s to the present, mainstream evolutionary thinking has assumed that selection at the level of the group was not powerful enough to overcome the effects of selection at the level of the individual except under very unusual conditions (Williams 1966). Theorists including Gintis, Fehr, Wilson, and Boyd and Richerson are challenging this, and the study of human altruism is what has led them to do so. It remains to be seen whether their challenge will be successful.

Others claim that in most real human situations what are defined by these game theorists as altruistic punishments do tend to be ultimately rewarded in the kinds of social environments typical of ancestral human environments (Maynard Smith and Harper 2003, 126; Patton 2000; 2003).

In these environments there is a longer time over which rewards can flow back to those who are conspicuously altruistic, and the flow of benefits in many forms and in many directions not only goes on over a life span but continues between descent lines as children pick up the social debts and resources of their parents. These rewards over long periods of time often come in the form of increases in reputation and status. Indirect reciprocity is a very long-term strategy.

The possibility that the created co-creator idea can be successful as a guide to behavior does not depend on the outcome of this debate. It is clear that human beings can under the right conditions be motivated to behave in ways that are beneficial to large human communities. The practical question for the immediate future is how best to encourage this sort of behavior. This is exactly the question that a created co-creator should ask herself. Part of the answer lies, I argue, in good scientific research that tells us how to encourage large-scale altruism.

Hierarchies

One element that is present in almost all large human social groups is political hierarchy. Recent theoretical work by Robin Dunbar (1996) sheds light on the role of hierarchy in forming large human social groups. He approaches the question of the formation of larger social groups from the perspective of a primatologist. In terms of theory, his view of what is involved in the formation of larger groups is very much in line with that of Alexander (1987). However, he approaches the question primarily in terms of empirical data and apparently has not read Alexander's watershed 1987 volume, which is not part of the primatological literature narrowly defined. He does not use the term *indirect reciprocity*, but his thinking incorporates a very similar idea.

He begins by observing that among primates grooming is the primary signal of social closeness and probable future altruistic aid. He then suggests that, in human groups, gossip and small talk have replaced grooming and have done so because this facilitates the formation of larger groups. One can gossip with several individuals at once but can groom only one at a time. This role for gossip became possible only after the advent of language, and Dunbar says that this was the primary reason for the evolution of the human capacity for speech. He presents data showing that the size of groups and the size of the neocortex are strongly correlated in primates and in some other highly social mammals, suggesting that the expansion of brain power is primarily an adaptation to complex social life. By tying social behavior to anatomy in this way, he allows us to infer that the expansion of the human brain in the genus *Homo* over the last 2.5 million years may have been an adaptation to the formation of larger and larger social groups. He presents data from the study of military, business, and reli-

gious organizations that show that the largest human group that can be held together by gossip and small talk is in the range of 150 members. Human groups of course are often much larger than 150, and he observes that larger groups tend to be organized around hierarchies. Groups of 150 or fewer can easily reach a near consensus on how to act because most of the members are in close contact with many other members. They have overlapping networks of people who frequently engage one another in gossip and small talk.

I would suggest that gossip and small talk are vehicles for indirect reciprocity. I find it interesting that Alexander sees morality as a form of social cement holding larger human groups together, whereas Dunbar sees gossip as doing the same thing. No doubt, a central topic of gossip is always the morality of other members of our social groups. Gossip and morality are closely interconnected in human social life.

Human groups of 150 or more are able to stay together and cooperate in significant ways only if they are organized around hierarchies, which allow some individuals greater power to coerce and punish nonconformists and freeloaders. This result is consistent with the views of anthropologists who study social and cultural evolution (Johnson and Earle 2000; Earle 1997). They see the origin of the office of chief and societies organized around chiefs as a crucial step in social evolution that allowed the formation of larger social groups. Eventually the simple political hierarchies of chiefdoms were replaced, in many areas of the world, with states—centralized governments employing bureaucracies and standing armies as means of controlling their citizens or subjects. I propose that the difficulties many theorists have in seeing how large groups can be held together with indirect reciprocity, signaling commitment, and moralistic strategies will disappear if they add hierarchy to the mix of strategies used by human beings to hold large social groups together. Unlike commitment and punishments, hierarchy goes beyond indirect reciprocity.

Hierarchy is obviously important in holding human social groups together, and future game-theory experiments would do well to somehow incorporate it. This may be difficult, however, because a group of more than 150 with a formal hierarchy may be difficult to create with volunteers for an experiment. Our understanding of the role of hierarchy in holding groups together may have to depend on ethnographic and historical data. It might also make sense to look for a propensity to altruistically reward those who are conspicuously generous or helpful to other players. It seems logical that indirect reciprocity should include rewarding behavior that is especially beneficial to others or to the social group as a whole as well as punishing freeloading.

The three categories of commitment, punishment, and hierarchy complement each other, and I believe all are valid as explanations of how human beings have managed to create large cooperating groups.

The Future of Large-Scale Human Cooperation

Created co-creators will be able to construct a wholesome future for our species only if they are able to create worldwide cooperation on a larger scale than has occurred to date. World religions and large nations are the largest groups that human beings have managed to form so far. In order to fully carry out Hefner's proposal contained in the created co-creator concept, the nations of the world would need to cooperate to enforce a course of action for everyone that would do the many things that science tells us are necessary for the creation of a wholesome future.

There have been weak trends toward this sort of international cooperation in recent history. This indicates that the larger-scale cooperation required to create a wholesome future for all of humanity may be possible. Such trends toward greater global cooperation are in marked contrast with earlier history. With more extensive economic interdependence, communication, travel, and a more widely shared awareness of the consequences of human action for the future, human beings may be able to create a wholesome future.

In addition to greater international cooperation, another hopeful sign is the increase in interfaith cooperation. If followers and leaders of different religious traditions can see themselves as sharing a common purpose of working toward a more wholesome future, this can provide much of the motivation necessary to fulfill the promise of the created co-creator.

We should not be unduly optimistic, however. For science to understand precisely how our activities affect the future is not an easy task. The protracted debates over global warming provide one reason for concern. Controlling this phenomenon requires some sacrifices, and this is not easy for everyone to accept. Awareness of these sacrifices, in my opinion, has motivated "research" designed to prove that the phenomenon is not real or at least not nearly as extensive and dangerous as some think. This is only one of many such problems. Resistance to the measures necessary to create a wholesome future is a serious obstacle to creating a healthy future environment.

Also, the world today is still characterized by separate nation-states that have very different agendas for the future, and some nations are willing to go to war with others to pursue these agendas. Much change is necessary before we can hope for the created co-creators to actually create a future that is wholesome for the entire population of the world.

Smaller Arenas of Human Action

Up to this point I have discussed the most ambitious interpretation of Philip Hefner's theology of the created co-creator. This is the hope that human beings can create a wholesome environment for the entire population of the planet. However, I think it is useful also to examine the created

co-creator in terms of the effects of human choices on small arenas. We make many choices that affect our families, our work places, and our local communities. Throughout the history of our species, this has been the purview of most human concerns.

At the level of smaller social groups, it is easier for us to think of ourselves as working to finish an incomplete and imperfect creation. Humans can take as our goal striving to make each of these smaller social arenas a more wholesome environment for those affected by it. At this level, our guiding sacred story could be the story of George Bailey, the hero of the modern American myth presented in the film "It's a Wonderful Life." We can turn to other real heroes who have contributed to creating a more wholesome future by their personal action: Martin Luther King Jr., Mohandas Gandhi, Bishop Desmond Tutu. At the same time, we need to be cautious about the destructive ways in which some individuals—Hitler, Stalin, Pol Pot—have created a less wholesome future.

What about Nontheists?

For those who have a theistic worldview, Hefner's theology of the created co-creator can serve as a guide to our ultimate purpose in the rapidly changing world in which we live. For nontheists, it can serve as well, but in a somewhat different way. I am not convinced that the environment we find ourselves in was created for us by a benevolent guiding force beyond our species; in fact, I strongly suspect that it was created by a set of forces that are indifferent to our well-being. This might seem to make my worldview and Hefner's incompatible. However, the Judeo-Christian doctrine of the fallen nature of humanity rescues us from this situation. A fallen humanity and a humanity created by indifferent forces seem to me very similar in terms of what we can observe about human nature and about the world of living things as they exist today. The two views tell very different stories of the origin of this fallen state, but what they describe as the current state of ourselves and our world are very similar, and they leave open the idea that we can create a better future world.

I once heard a theologian suggest that Richard Dawkins's *The Selfish Gene* (1989) is an alternate account of the fall. In a way this is true. The religious stories in Genesis explain the origin of evil and of the fallen nature of human beings. Given its emphasis on the origin of selfishness or choices that increase conflict, Dawkins's book can stand as an account of the origin of selfishness, conflict, and suffering. Yet conflict, suffering, deception, predation, and parasitism can be evil only if someone is aware of them and can make a choice for or against these things. Nontheists can make choices that decrease conflict and suffering and choices that increase conflict and suffering. Thinking of one's ultimate goal as trying to contribute to the creation of a more wholesome future can serve as a guide for nontheists as well.

Conclusion

I do believe that human beings have an evolved capacity to behave altruistically as well as selfishly and that this view can be defended in terms of current evolutionary science even though it is not science but rather an extrapolation beyond science. We have to make choices that cannot be fully justified by science alone. The belief that human beings can be motivated to create a more wholesome future on both a small and a large scale is compatible, I believe, with what we learn from human behavioral ecology and evolutionary psychology. In the right kind of environment, people can be motivated to emphasize the altruistic side of their nature and to expand the reference groups toward which they direct their altruism. Useful guides to the kinds of environments that will encourage this expansion of cooperative behavior can be found in Elinor Ostrom's *Governing the Commons* (1990), Matt Ridley's *The Origin of Virtue* (1996), and Robert Wright's *Nonzero* (2000). There is hope for the future of our species, and human beings may yet fulfill the purpose defined by the theology of the created co-creator.

Note

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THE KENOSIS OF THE CREATOR AND OF THE CREATED CO-CREATOR

by Manuel G. Doncel, S.J.

Abstract. I comment on moral and theological aspects of human technology, which I consider as an evolutionary moment of our cultural and genetic variation. It is an important moment both scientifically and theologically. Starting from Philip Hefner's theological program of the human being as created co-creator, I distinguish between the limitations and responsibilities of the human being as a created agent and the possibilities and ideals as a co-creator. I develop the idea of the *kenosis* (self-emptying) of the Creator, which as the root of God's love principle should be reenacted by the created co-creators. I analyze elements of this kenosis presented by Jürgen Moltmann in relation to creation and eschatology.

Keywords: created co-creator; Creator's kenosis; cultures' rights; eschatology; global culture; Philip Hefner; human kenosis; image of God; laws of nature; love principle; Jürgen Moltmann; new creation; Trinity; zimzum.

I consider human technology to be an evolutionary moment of our cultural and genetic variation. Scientifically, it is an important moment of our global cosmobioevolution. Theologically, it becomes decisive in an eschatological perspective, that is, from the perspective that includes the final consummation of history. I start from Philip Hefner's theological program of the human being as created co-creator (Hefner 1989; 1993, chaps. 2, 4, 5; 2003). For my purposes I distinguish between the limitations and responsibilities of the human being as a created agent and the possibilities and ideals as a co-creator, created in the image of God. In what follows I develop the deep idea, hidden in the core of Hefner's program, of the Creator's *kenosis* (self-emptying), which constitutes the very root of God's

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love principle and should then be personally and socially reenacted by the created co-creators (Hefner 1989, 224, 228, 230). I analyze some elements of this kenosis that are presented by Jürgen Moltmann ([1985] 1993, 86–93; [1995] 1996, 292–95) in relation to creation and eschatology[1] and apply them to the technology of the human being as created agent and as co-creator.

The Kenosis of the Creator, Its Elements, and Its Cessation

The Christian idea of *kenosis* ("self-emptying") is conceptually and etymologically grounded in the New Testament hymn verse in Philippians 2:7: "Rather he [Jesus the Christ] emptied himself [*heauton ekenosen*], taking the form of a slave, coming in human likeness" (NAB). This kenosis has been traditionally applied to the incarnated Logos,[2] but, under the Jewish influence of the mystical *zimzum*,[3] the kenosis is now also applied in Christian theology to the Creator. This leads to the necessity of proposing a new concept of God: from primarily being absolute power, God is thought of as primarily absolute love (Balthasar 1969, §1.4).

Such a kenosis is characteristic of any love relation, which does not search for absorption or identification—that the other become more as myself—but for a relational unity presupposing diversity and integrity—that the other by his or her relation to me become more him- or herself (John Paul II 1990, M8, §18). So, according to Hans Urs von Balthasar, this kenosis should be also presupposed to be intrinsic to the concept of God as Trinity (*ad intra*), in the eternal love relation of the divine Persons: each of them should respect and leave existential place to the others. And what we consider in God's creation or incarnation is a manifestation of the same interpersonal kenosis in God's external relations to the world (*ad extra*), in relation to the creatures.[4]

Thus, we can imagine the kenosis of the Creator as a self-restriction of divine being, freely realized in loving respect for the creatures that are to be created. Such self-restriction is required in order to offer to creatures metaphysical play, so that they can exist and act as autonomous created beings. To express it more concretely, prior to the decision to create the universe the Triune God freely decided to accept the position not to be the only existent; other beings different from God would also exist. Even if God remains the *necessary* condition of everything, God freely accepted being only one *sufficient* condition of every particular effect, because other beings different from God would also truly act (William R. Stoeger, in Russell, Murphy, and Peacocke 1995, 254). It follows that when a universe of physical and free personal creatures has been designed, with a special purpose for those creatures, this kenosis of the Creator will embody a whole variety of elements. For clarity, I classify these elements as belonging to three different levels: physical, moral, and eschatological.

Space-time and the Laws of Nature. The mystical self-restriction of Isaac Luria's zimzum seems to be spatial, but it is really metaphysical in character. With the decision to create a bodily and temporal universe, "God as eternal and omnipresent restrains Godself to allow creation to be, thereby giving it time and providing it with a habitat of its own" (Moltmann in Russell, Murphy, and Peacocke 1995, 206). Theologians say today that God becomes temporal, entering into the co-created time. If they think of the world expansion from an initial Big Bang, they consider God's omnipresence to increase over a span of 15 to 20 billion years to distances of as many light years.

Our cosmological and evolutionary models are based in the physical and biological laws discovered by modern sciences. An accurate analysis of the long process of cosmobioevolution yielded by these models discloses an immanent directionality, which can be scientifically explained and includes the role of chance, especially in the mechanism of genetic mutations (Stoeger in Russell, Stoeger, and Ayala 1998, 163–82).

Theologians today contemplate this long process as God's continued creation, mediated by the interplay of laws and chance. And already Karl Rahner elaborated philosophical views on causality, according to which the Creator, as required by the kenosis, totally respects the autonomy of this cosmobioevolution.[5]

Human Freedom and World Autonomy. The most momentous element of this Creator kenosis is related to our human actions, or actions of any free responsible beings, wherever they reside. To respect this freedom seems to require that God allows moral evil or sin—that is, allows creatures to react against the divine will. Denis Edwards makes this point when he writes, "Real freedom is the freedom to enter into love, to risk oneself with another. . . . And the trinitarian God is . . . free beyond comprehension to enter into the vulnerability of loving communion" (in Russell, Murphy, and Peacocke 1995, 165).

John Polkinghorne makes a parallel between the "free wills" of human agents and the "autonomous processes" of the world regulated by natural laws. Thus, he considers a new element of the Creator's kenosis, the fact that God allows the autonomous course of such world processes. This fact can throw new light on the problem of physical evil. As he graphically says, "God neither wills the act of a murderer nor the incidence of a cancer, but allows both to happen in a world which God has endowed with the ability to be itself" (in Russell, Murphy, and Peacocke 1995, 446).[6]

Eschatological Cessation of God's Kenosis. According to Moltmann, this kenosis is transitory ([1995] 1996, 294; [1989] 1993, 328–30). It began at the primordial moment of God's creative resolve with a divine self-restriction; it will cease at the end of time, that is, at the unpredictable eschatological moment of God's redemptive resolve, with a divine de-restriction

of self. This de-restriction supposes the glorious manifestation to the creation of God's being "all in all" (1 Corinthians 15:28) in an eschatological panentheism. Then it will no more be either space and time proper, or death and sin, but interpersonal loving of the created and trinitarian persons.

I wish to emphasize that, in this interpersonal life without evil and death, our laws of nature must also cease. Our "spiritual body" (1 Corinthians 15) can no more obey such physicochemical and bioevolutionary laws, on pain of producing death again. I find it therefore improper to elaborate a "physics of immortality" (Tipler 1994). These laws, although designed by the Creator, have to be thought as transitory.[7] Laws governing the new creation will promote only the interpersonal human and divine relations.

God's Purpose for the Creation. This physical, moral, and eschatological character of the Creator's kenosis appears to us as love's endeavor, a work of love (Wanstone 1977; Polkinghorne 2001). The essence of the trinitarian God is love, which is exchanged among the divine Persons in an eternal intercommunication (*perichoresis*, circumincession). The new application of the divine kenosis intends to introduce a whole world of created persons within the being itself of God, amounting to an extended intercommunication of sorts. Such creatures should be designed with respectful tact so that they become persons, and they should also experience restoration from disorders.

For Christian theology, the function of designing created persons is the proper work of the Word/Wisdom, who is said to be "beside the Creator as his craftsman" and who "found delight in the sons of men" (Proverbs 8:30–31 NAB). Christ, being incarnated, perfectly realized this design as the "definitive Adam" (1 Corinthians 15:45). Their restoration is the work of the Holy Spirit, who, forgiving sins (John 20:22–23) and reestablishing the interpersonal communion (*koinonia*), prepares the world for their eschatological assumption into the being of the trinitarian God (Doncel 2002).

The kenosis, eternally existing in the love relations among the divine Persons, was glorious and joyful. But it became vulnerable when it was related to contingent and indigent creatures who might respond to God's love with physical and moral evil. Thus, this vulnerable kenosis is God's act of patiently bringing into being creatures who are capable of being introduced into union with God. However, the vulnerable character of God's kenosis will come to an end, together with every physical and moral evil, at the point when these personal creatures are consecrated in indefectible love and living in interpersonal communication with God.

The Kenosis of the Created Agent as Governed by Providence

If God works kenotically in the creation, far more should we do so as *techno sapiens*. We should do so as created agents—contingent, flawed,

and causing evil and vulnerability. As created, we are in all respects conditioned: in the ecosystem where we emerged, in the genome and culture we inherited, and in the human group to which we belong (Hefner 1993, 36–38). This belonging makes us truly responsible and also reveals that we are immature creatures on our planet; compare our culture of technosciences or that of *Homo habilis* (one hundred years old and two million years long, respectively) with the genetic experience of our planet (billions of years long). It is not strange that our planetary activity might produce ecological crises! We cannot replace God's providence but only learn from and follow it. We shall therefore think comprehensively about our limitations as human technicians, also from our three perspectives—the physical, the moral, and the eschatological.

Technical Limitations and Sustainability. Our first limitations are related to space-time. In spite of the growing speed in our communication and transmission techniques, our space dimensions are today planetary, practically the same as those of *Homo erectus* (1.6 million years ago), wandering from continent to continent. Only in the last generation have we attempted to pierce through a larger technological space. In spite of the rapidity in our electronic computation and mass production, it still takes decades of our active life for us to bring a personal technological project to fruition. We are dependent upon our culture and upon the programs past generations conceived and transmitted to us. This should remind us of our reciprocal obligation to future generations.

Other limitations on the planetary scale concern raw materials and energy. We are forced to consider using recyclable material and renewable energy resources. Of course, the whole is critically dependent on our provisional knowledge both of technology and of science (see Fernández-Rañada 2002).

Economic Exploitation of Human Rights and Ecological Rights. Being created rational and free, we feel responsible for the rights and well-being of our human group. But altruism toward our genetic and cultural group is really much less than it should be. Our belonging to the human group bestows on us special obligations toward our whole ecosystem. We should consider not only human but also ecological rights, grounded in our kinship within our evolutionary process.[8] The solid reasons for caution in interfering with the ecosystem, in my opinion, are our ignorance of "the consequences of such interference in other areas" and respect for "the well-being of future generations" (John Paul II, in Edwards 1991, 116 n. 3).

The Transitory Character of our Technical Enterprises. As previously discussed, our laws of physics and biology are transitory; they have an unknown but finite life, until the consummation of history and the end of time, which theology terms "the eschatological moment." Our technology,

founded on these laws, must then also be transitory. This assessment of faith is consonant with scientific predictions of the far future.[9] Such an assessment should not bring us to a kind of disdain regarding our technical enterprises and their progress. The eschatological new creation will not be "out of nothing" (*ex nihilo*), as the original creation, but "out of the old creation" (*ex vetere*) in which we now live (Polkinghorne 1996, 166f.). Thus, the dimension of eternity is introduced into our technical activity, particularly if that activity is guided by the love principle. For instance, solidarity with the third world in order to find ways of sharing well-being will surely deserve eternal value (Matthew 25:35–36).

No Terrestrial Utopia, but World Autonomy and Eschatological Stimulus. By looking comprehensively over the last three sections, physical, moral, and eschatological in character, we recognize the ambivalence of our evolutionary human group. On one hand, we experience our impotence and selfishness in the face of the magnitude and the progressive directionality of the whole cosmobioevolution. On the other hand, we experience the richness of our human situation as the point in which this process has become conscious of itself as well as accountable to the wholeness of the world process.

God's kenotic and purposeful creation transcends these scientific views. Christians hope for an eternal utopia, deeply rooted in faith in the resurrected Christ, which is not a terrestrial hope.[10] Our final goal is not something we can reach or build by ourselves, as was wrongly conceived by Rousseau, who believed in the saving power of nature, or by Marx, who trusted in the social success of dialectical materialism. Our technical activity, although realized in the autonomous world that God's kenosis rendered possible, is efficacious only insofar as it is supported by God's transcendental action, which is to be humbly and graciously received.

Nevertheless, this by no means supposes that humanity and technology have no value in themselves. On the contrary, through God's purpose for the creation, our activity includes in itself a value of eternity when realized in accord with this purpose. This constitutes a supreme Christian stimulus for technological activity. The Second Vatican Council, after acknowledging the rightful autonomy of the human social and scientific world, considers human activity in this eschatological perspective and exhorts, "Still our hopes of a new world should not lessen but stimulate our anxiety to improve the present world, where the new family is taking shape" (Vatican Council II 1965, §36 and §39.2).

The Kenosis of the Co-creator as Image of God Consonant with Providence

As we have noted, kenosis marks the whole activity of the Creator as a work of love. It expresses the Creator's love principle and God's own self,

who is love (1 John 4:8–16). God practices this love principle with total universality: "Your heavenly Father . . . makes his sun rise on the bad and the good" (Matthew 5:45 NAB). This is the symbol of divine providence.

Because we are created in God's image, we should imitate God. Our kenosis is an expression of the love principle and should also mark all human and technological activity as co-creators. We have in the past understood wrongly the biblical text about our dominion over the world (Genesis 1:28), and that misunderstanding is the result of our faulty idea of God and God's dominion. We should learn from God's lovingly self-restricting respect for all creatures and so follow the command to "cultivate and care for the Garden of Eden" (Genesis 2:15 NAB). In our ecological age, this means care for the whole earth, which we know now to be the kinswoman and mother that we have carelessly abandoned. At the very least, we should respect her as a very complex system of systems on which our future generations depend.

Let us again reflect on human technology at our three levels, but from this positive Christian perspective of consonance with God's providence.

Mastering and Co-steering the World's Evolution. In this kenotic spirit we should first strive to understand the mysteries of nature in all their depth and breadth, motivated by the most traditional view of God's revelation and purpose. This means today to do scientific research to discover—in our poor mathematical expression—the as yet unknown laws governing the world (Stoeger in Russell, Murphy, and Isham 1993, 209–34). This scientific research should include the astrophysical extrapolation we call cosmology as well as the complex of molecular biology and neuroscience insofar as we think it competent to describe genetic-cultural evolution.

Only by strict attention to these laws of the evolving world can we undertake to steer it so that our planet can be hospitably preserved for all of its inhabitants.[11] If that proves impossible, we should steer the flight of all humankind to a more hospitable planet. Such are the thoughts we consider today as survival strategies for our future generations. These strategies should be incorporated into our human activity.

Universal Love Principle and the Rights of the World's Cultures. The love principle, as it is implemented in our actual behavior, must begin by loving the neighbor whom we see (1 John 4:20). Who is our neighbor? Answering this precise question, Jesus taught that the neighbor might belong to hostile Samaritan countries (Luke 10:29–37). In our world of Internet and television, all the nations of the planet are our neighbors. But if we see ourselves within cosmobioevolution, our neighbor is any humanoid on whatever planet it inhabits, even though we may chiefly concern ourselves with future generations here on Earth.[12]

The central point of this kenotic interest is the development of human and social dimensions, perhaps also of our genetic good, through steering

of our culture. Genetically we are one species but culturally a plurality of contradictory cultures. We should defend each of them and their biodiversity by establishing the rights of the culture, not only the rights of the individual person. The universality of the love principle should embrace any human culture and all of its positive values, in spite of the threats that may attend a unification of cultures.

The Eschaton and the Globalization of Cultures. The eschatological concept of the kingdom of God and related biblical images[13] point to what I call God's home, which is finally a home that is unified on the basis of free interpersonal connection. Pierre Teilhard de Chardin grandly imagined the last evolutionary moment of the "human phenomenon" as the "socialization of the noosphere." This consists in the formation of a kind of superorganism in which cellular individuality and specialization will not at all be lost but deeply enriched (Teilhard 1955, 289–92).[14]

The actual dynamism of unification, however, will bring—as historical invasions brought—a certain hybridization of cultures, regulated in the new spirit of natural selection that includes selection by human decision. Through such successive processes of hybridization, a global *techno sapiens* culture will begin to emerge.[15] These processes should be inspired not by biased and wicked interests but by a truly geographical-historical love principle. According to this principle, global technological activity should manifest an organismic solidarity. It should not try to absorb all members into the lifestyle of the leading members, the elite, but kenotically acknowledge and enrich the lifestyles of all members of the world society. Such is the style of God's providence, which we as co-creators should imitate.

Collaborating with the Logos and the Spirit. In our kenotic role of co-creators we should collaborate to prepare our world, interpreted as kingdom of God, for its eschatological purpose. This purpose has been designed by God's Logos from the beginning and fully realized by this same incarnated Logos, Jesus of Nazareth, who "anointed with the holy Spirit" preached this coming kingdom and "went about doing good" (Acts 10:38 NAB; Edwards 1991, chap. 4) and by giving his life in obedience to the Father, and by his being "resurrected by the Spirit of holiness" (Romans 1:4) as a foreshadowing of the final resurrection.

In my opinion, our activity through sophisticated technoscience can only help us to do good by practicing the love principle in a more universal modern way. For that purpose, it is essential to be sacramentally "anointed by the Spirit," who, as the wind, "blows where it wills" (John 3:8 NAB) within cultures and religions. Only the Spirit can restore our broken world, bringing love and interpersonal life, and finally introducing the new creation into the very life of the interpersonal trinitarian God.

Rahner treated the topic of whether the consummation of our personal life and world activity is immanently realized by our own being and strengths

or is offered transcendentally to us from God's independent liberality. Recalling his conception of our spirit as openness to the transcendental Mystery and the directionality of the whole creation in its matter-spirit kinship toward the self-offering of this Mystery, he concludes that this consummation of our life and activity is at the same time both transcendental and immanent (Rahner 1967). This bespeaks the deepest expression of the definitive value of our human and technological activity. As was said in the Second Vatican Council, "Christians . . . are convinced that the triumphs of the human race are a sign of God's greatness" (Vatican Council II 1965, §34.3).

Notes

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1. This view of the divine kenosis can clarify God's purpose for the universe and its eternal destiny. It also questions the definitive role of prehuman processes of nature (see Hefner 1993, 73–74).

2. Traditional interpretations relate to the self-emptying of God's divine condition in the Incarnation (Käsemann 1950), but more recent Christologies think on the new Adam and his renunciation of incorruptibility, without supposing the preexistence (Dunn 1980, chap. 4).

3. This idea was developed in Galilee by Isaac Luria (1534–1572), working on the Kabbala (13th century, in Girona, Spain). *Zimzum* means concentration and contraction and, for Luria, signifies a withdrawing of God into himself, setting free a kind of "mystical primordial space" in which a world outside God is made possible (*creatio ex nihilo*) (Scholem 1954, 7th lecture; Moltmann [1985] 1993, 87).

4. This constitutes a new application of the "Rahner rule," that the "economic Trinity," manifested in the history of salvation, is the "internal Trinity" (Rahner 1960).

5. Arthur Peacocke illustrates the interplay of laws and chance with a musical image: The Creator is like a composer playing with a repetitive melody and unpredictable fugues. See Russell, Murphy, and Isham 1993, 140. According to Rahner, in this process of cosmobioevolution God does not exert "categorical" actions within the world but supplies only the "transcendental" action maintaining the world in its existence and activity. This is sufficient to explain the continuous emergence of new richness of being, in the frame of his view of causality as "dynamic self-transcendence." Because of the kinship of matter and spirit, it may be applied even to "hominization," or emergence of human, spiritual beings (Rahner 1961, 79–84). Recent theologians emphasize this view of causality as self-transcendence and see its divine dynamism as the life-giving work of the Holy Spirit (Edwards 1999, 90).

6. Polkinghorne systematically speaks of "free will" and "free process"; I believe that one should distinguish "free" proper and improper, and speak of "autonomous process."

7. Other much more fundamental elements of God's design have to be also considered as transitory, as, for instance, the theological virtues faith and hope according to Paul (1 Corinthians 13:8-13).

8. I believe, nevertheless, that the concern for biodiversity should not convert our planet into a living museum of its evolution, wild beasts and pathogenic microorganisms included.

9. In about 5 billion years' time, our dying sun is expected to hugely increase and swallow Mercury, Venus, and Earth.

10. As decreed in the Council of Vienne (1311), "we can not reach in this life the final beatitude in its whole perfection" (Denzinger [1854] 1959, § 474).

11. This includes maintaining the natural nutrients and wholesome places of our planet, its energetic and material supplies for clean technical enterprises, its possibilities of freight, person and word transportation, its mild human clime, its defenses from dangerous external radiations, and so on.

12. In this universal perspective the purpose of our activity must be clarified. It cannot consist in capitalistic enriching of personal lives. We should universally extend the Christian

doctrine, assigning capital a social function for the common well-being (so that, for instance, property fades in the case of extreme necessity).

13. The images are those of "the holy city, a new Jerusalem," the tabernacle and "God dwelling with human race," "God's people and God himself always with them" (Revelation 21:1–3 NAB).

14. Teilhard's superorganism is inspired by the "mystical body of Christ" with the variety of its charismas.

15. Such ideas as hybridization and globalization were offered on 12 December 2001 by Françoise Rivière, vice president of UNESCO, in the first presentation of the program for the "Universal Forum of Cultures," Barcelona, 2004.

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CREATED CO-CREATOR AND THE PRACTICE OF MEDICINE

by Ann Pederson

Abstract. There is a crisis of interpretation experienced by those making critical-care decisions and creating health-care policies and by the patients and families who make life-and-death decisions. For example, at both the beginning and end of life, new technologies are changing the way we define life and death. We can prolong life or hasten death in ways that we could not earlier have imagined. This crisis of interpretation demands new ways of thinking and doing. My task is to explicate how the created co-creator can be used as a springboard to help link theological concepts with feminist concerns about two issues: interpreting the culture and practice of medicine in a new way, and explicating the ambiguity of decision making when considering issues of life and death.

Keywords: ambiguity; bioethics; created co-creator; feminism; health; in vitro fertilization; medicine; reproductive technologies.

Recently my work in religion and science has shifted into bioethics, particularly as I consult and teach with physicians in reproductive medicine and palliative care. The questions and issues that I encounter in these areas raise ethical and theological conundrums that demand creative and careful analysis. While the disciplines of religion and science and bioethics are related, they are more like cousins than siblings. Many of the issues cover similar methodological and substantive ground, yet the field of bioethics often raises urgent dilemmas in acute health-care situations that provide opportunities for analysis that differ from those in religion and science.

Philip Hefner's theological framework of the created co-creator is a jumping-off point for advancing the discussion in bioethics. In this essay I

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explicate how the created co-creator can be used as a springboard to help link theological concepts with feminist concerns about two issues: interpreting the culture and practice of medicine in a new way, and explicating the ambiguity of decision making when considering issues of life and death.

In my work with undergraduates, fourth-year medical students, and masters-level nursing students, I encounter a broad range of issues that need addressing. A common theme with all of the students I teach is similar to what Hefner names as a crisis of interpretation in our technological and scientific age. Hefner explains:

> Ours is a technological culture, and I believe that our culture is at a crisis point, because we are not able to direct our culture in ways that promote the most wholesome life for the human community and its encompassing natural environment. One of the features of this crisis is that we are in many ways alienated from nature and technology, and hence from ourselves. Since the created co-creator embodies our oneness with technology in a vivid manner, it is a symbol both of our truest nature and of our alienation from our nature. (Hefner 2002, 5)

This crisis of interpretation is experienced by those making critical-care decisions and creating health-care policies, and by the patients and family members who make life-and-death decisions. For example, at both beginning and end of life, new technologies are changing the way we define life and death. We can prolong life or hasten death in ways that we could not have imagined. However, many people are personally unprepared to face those decisions in informed ways. Therefore, many decisions are made in haste and with regret. The challenge before us is to be medically and scientifically informed about the issues and spiritually prepared to face them.

We are facing ways of being human that have changed in unprecedented ways, and this demands new ways of thinking and doing. Witness the human genome project as evidence. Many bioethicists regard the principles and abstract theories as insufficient for these new questions. We need frameworks that creatively confront and confound our previous ways of thinking and push us into new ways that are both fruitful and wholesome not only for human life but also for the life of this planet. Such an agenda is urgent. Hefner has found that the work of certain feminist theorists helps expand his notion of the created co-creator and interpret our relationship to technology and nature. In particular, he has drawn on Donna Haraway's use of the cyborg. I believe that Hefner's construct of the created co-creator is a matrix that provides a fruitful springboard for connecting feminist thought and theology. He notes that his construct does not challenge traditional Christian doctrine as much as it "accentuates those ancient teachings, and also puts a new face on them" (Hefner 2002, 5). His improvisation on the themes of previous traditions brings their melodies in new harmonies to different ears.

Traditional worldviews that inform the practice and science of medicine, often embedded in Enlightenment dualisms, pit technology against

nature and human against nonhuman nature. Some who practice medicine still consider the body a machine and the physician a mechanic who simply fixes parts. The focus is on cure, not care. Intervention takes precedence over prevention. We worry about the immediate decision and ignore the long-term consequences.

Technology is changing who we are so rapidly that our self-understandings cannot keep up. For example, the traditional definition of parenthood is radically challenged by advances in reproductive medicine. Hefner joins the created co-creator with Haraway's cyborg to address the boundaries in this changing landscape of the human situation. The result is a powerful construct that shatters dualisms. With this in hand, Hefner speaks about *technonature* and *culture-nature*, constructs that expand boundaries. Technology, nature, and culture weave webs of relationships in which humans find themselves caught. Hefner's construct of the created co-creator provides a way into and through the relationships that inform, provoke, and create ways of being in relationship that promote human wholeness. Our well-being is linked to the well-being of all creation. Feminist bioethicists sharing similar concerns with Hefner also urge us to find new ways to think about the ethical issues that we face.

This reshaping begins with epistemological and methodological changes. Karen Lebacqz, a feminist ethicist, shares her concern that the "predominant western approach to bioethical issues suffers serious limitations and should be challenged in light of some emerging ethical reflection, particularly that of feminist and liberation theology" ([1980] 1998, 83). She explains that the prevailing paradigm or approach to bioethics has the following five features: (1) The focus is decision-oriented, on "doing the right thing." It assumes one right answer. (2) The primary approach is highly individualistic, specifically on the physician-patient relationship. (3) The methodology is ahistorical and does not take context or social location seriously into decision making. Generalizations abound, and universal answers apply to all contexts. (4) Scientific evidence is considered normative, and feelings and emotions are ignored as "data." (5) There is a "failure to specify the grounding of norms" ([1980] 1998, 86).

Drawing on the work of feminist and liberation theologians, Lebacqz provides some challenges and alternatives to these five features: (1) Feminist and liberationists are not as concerned about the right action or right answer as about analyzing and discerning structures of meaning and power. One must look at the dominant social structures and lives of those impacted by them. (2) The individual is interpreted in relationship to context: his or her immediate life story within the larger narrative. This is similar to the task of theology, which takes into account story and experience as data for reflection. (3) A historical approach considers the social context and location as a beginning point for ethical discernment, particularly the "oppression of people through time" ([1980] 1998, 87). (4) Scientific

"facts" are not the only sources for evidence. Experience of those who have been avoided, ignored, or oppressed must be considered. (5) The norm for ethical theory is not universal but must consider the standpoints of different groups ([1980] 1998, 84–88).

Other feminist bioethicists share many of Lebacqz's concerns. Margaret Farley notes that the themes of relationality, human embodiment, and human assessment of meaning and value of the world of nature are central to feminist bioethics ([1985] 1998, 91–95). These themes seem like a match made in heaven with the theological framework of the created co-creator. The epistemological and methodological framework for making ethical decisions is enriched through the use of narrative, social location, expanded data, and a diversity of perspectives.

Hefner's agenda, like that of many feminist and liberation theologians and ethicists, promotes concern for both the human community and the natural environment. The heart of Hefner's theological framework is:

> Human beings are God's created co-creators whose purpose is to be the agency, acting in freedom, to birth the future that is most wholesome for the nature that has birthed us—the nature that is not only our own genetic heritage, but also the entire human community and the evolutionary and ecological reality in which and to which we belong. Exercising this agency is said to be God's will for humans. (Hefner 1993, 27)

Discerning what is wholesome for human life and nonhuman life is the task of Christian theology and also the task of bioethics. Careful theological analysis is needed to make the transition from the scientific/technological discoveries to the implications for ethics. People often make gut-level decisions without careful deliberation. For Christians, that deliberation must be theological. Hefner's framework provides structure and clarity to advance the theological and ethical discussion. A place to begin this discussion is with the culture of medicine itself.

The traditional medical model and prevalent approach to bioethics often reinforces dualistic thinking. How does one change a medical model that is reinforced by power and privilege? How does one change a framework of traditional bioethics that is wed to Enlightenment presuppositions? Susan Wolf, a feminist bioethicist, explains four features of the dominant medical and ethical paradigm:

> . . . a historical preference for abstract rules and principles that disregarded individual difference and context; an embrace of liberal individualism that obscured the importance of groups; the structure of bioethics as a field frequently serving government, medical schools, hospitals, and health professionals in a way that may have discouraged attention to the views of people lacking power inside and outside those institutions; and the frequent isolation of bioethics from major trends within the academy, including feminist, Critical Race Theory, and postmodernism. (Wolf 1996, 14)

In a similar way, Susan Sherwin demonstrates a need for an approach to moral issues that involves more than theories and principles in traditional

bioethics. She claims that a feminist model of ethics has an "interconnected social fabric, rather than the familiar one of isolated, independent atoms; and it gives primacy to bonds among people rather than to rights to independence. It is a theory that focuses on concrete situations and persons and not on free-floating abstract actions" (Sherwin [1987] 2001, 540).

A feminist approach to ethics involves more than abstract theories and principles that are addressed to abstract agents. In my work with the Masters in Community Health at Augustana College, I have discovered a program that challenges the dominant medical model and offers new ways of working with patients and their needs and fits with feminist theory. The nursing department at Augustana College embodies the heart of the created co-creator. Drawing upon different nursing theorists, they developed a program that emphasizes community health care based on patient needs. The emphasis of the curriculum is to "prepare nurses for health care provision to individuals, families, groups and communities, with particular emphasis upon populations who have limited access to health care by virtue of age, ethnicity, health status, geographic location or economic resources" (Augustana College 2002). The notion of health is constructed from the perspective of the patient, not imposed from the health-care provider. Contrary to most traditional medical models of developing notions of illness and health, this nursing department sends nurses into communities to listen and learn about the needs of people before a health protocol is ever developed. This forward-thinking program is taking risks to prepare nurses for the radically changing nature of health care. Furthermore, the nurses are prepared to serve underrepresented populations that traditional medicine has often ignored.

I teach the course "Feminist and Liberationist Approaches to Health and Wellness" for students in Augustana College's Masters Nursing programs in community health. One of the texts we use is *Refuge: An Unnatural History of Family and Place* by Terry Tempest Williams (1991). A poet and naturalist, Williams relays the stories of the slow death of her favorite bird refuge on the Great Salt Lake and of her mother's prolonged battle with and death from ovarian cancer. The stories parallel each other through movements of tragedy and spiritual grace.

In light of the nursing department's mission, I use *Refuge* as a model for how narrative and the construct of "place" help students to develop broad and inclusive notions of illness, health, and wellness. Williams's uses of story and location are powerful hermeneutical tools for developing the categories of illness and health that the nurses use in the communities with whom they are working. The students adapt Williams's understandings of place to inform how they work in the locations with the patients with whom they develop relationships. The book reinforces in stories what is learned in theory in the nursing program.

Williams writes, "Perhaps, I am telling this story in an attempt to heal myself, to confront what I do not know, to create a path for myself with the idea that 'memory is the only way home'" (1991, 4). As a theologian, I know that the way tradition is passed on is primarily through story and ritual rather than through abstract doctrine. Central stories manifest the character of the cosmic order and the human relationships within it. These stories shape the character of community life, and people find their place within the story. Identities are shaped by story, by remembering. The stories then are recalled in liturgies and rituals. Stories shape worlds, and the world also shapes the narratives.

Williams uses story as a means of expressing the metaphor of place in constructing a spiritual and ecological autobiography. The process of writing locates spiritual autobiography in the particular events and places of a person's life. We experience and interpret the world through the geographies, locations, and particulars of our lives. Feminist writers and theologians like Hefner share this use of location as a hermeneutical construct. They begin their narratives or theological exploration with the examination of lives as data for reflection. The idea of constructing spiritual geographies criticizes the disembodied, abstract writing and theological thinking so often influenced by the Enlightenment separation of mind/body, spirit/nature, God/world, male/female, subject/object.

The process of writing and reading spiritual narratives through examination of places in everyday life serves several purposes. First, constructing a narrative is a process. The very act of writing over time helps one to realize that his or her spiritual life is both a journey and a dwelling. Moments occur over a lifetime and accumulate to tell one's story. Second, narratives construct communities. In the act of sharing stories, people connect to other creative conversations and memories. These stories, much like the narratives of the gospels or the words of the liturgy, shape and bind people to one another and to a place. Third, narrative helps one to go back to know what one knew before and know it again somehow in a new and different way. Returning to the familiar, to one's origins, to one's place enables the self to be known in a new way. Fourth, writing a narrative enables a person to experience a kind of knowing that is internal and deep. This is not the location that has to do with street signs or maps; it is an embodied knowing. Williams calls it the erotics of place. Narrative helps students to look back, to return to places with new eyes. To see with new eyes is to be transformed by an alternative vision. Finally, narrative leads to transformation. We see anew what we have taken for granted. Through the process of writing our spiritual narratives, we can return to our origins.

I have each nursing student write a spiritual autobiography and then connect it to the story of Williams. What I have learned from reading the students' autobiographies and from their discussion of *Refuge* can be summarized in three points:

1. *Health is a much broader concept than is traditionally conceived of and taught in a medical model.* Williams writes, "An individual doesn't get cancer, a family does" (1991, 214). The nursing students spend significant amounts of their time in the community they choose, listening and getting to know the people. After relationships are established and trust is developed, the community members decide what their medical and health needs are. Then the nurses help the community members develop a plan to meet their goals and needs. This is vastly different from a traditional model in which the health practitioner simply fixes the part of the person like an auto mechanic tunes up an engine. Health is fundamentally a relational concept, rooted in one's place in the world.

2. *Human health is intimately linked to ecological/cosmological health.* "There are those birds you gauge your life by. The burrowing owls five miles from the entrance to the Bear River Migratory Bird Refuge are mine. Sentries" (Williams 1991, 8). An important correlation exists between one's place in the world and illness. Several women in the nursing program experienced the loss of their family farm at the same time that they lost a parent or significant family member. One woman from Aberdeen, South Dakota, wept openly in class as she linked Williams's narrative to her own—the death of her mother from cancer and the loss of the family farm. All occurred in the same year in the 1980s during the farm crisis. We now know that infertility and many illnesses are caused by exposure to pesticides and other chemicals on the farm. Economics and agricultural practices work hand in hand sometimes to create a toxic place for the inhabitants of farms.

Like Williams, the students in the nursing program recognized that their losses were deeply interwoven, complicating their grieving. In some cases, when the family farm was sold, the students experienced an onset of serious illness. They were losing their familial, spiritual, and economic grounding. One's ancestry is rooted in the relationships of place and people. The place of one's ancestry creates a way of knowing that is profoundly spiritual and profoundly sensual, rooted in the complexities of both over time. The grieving reveals this sensual intimacy.

Stories convey history and genealogy. "I have known five of my great-grandparents intimately. They tutored me in stories with a belief that lineage mattered. Genealogy is in our blood. As a people and as a family, we have a sense of history. And our history is tied to land" (Williams 1991, 14). This history is more than human; it is a cosmic history, a natural history. And this natural history provides the clues to all the deaths in Williams's family. Her history is identified as a "Clan of One-Breasted Women" (1991, 281). Ironically, it is this family history that is most often disconnected from and ignored in the study of health, particularly in the discipline of bioethics.

3. *The traditional model of bioethics must learn from writers like Williams that the health of women, like the birds in the refuge, is the canary in the mineshaft for judging the health of the planet.*

> We spoke of rage. Of women and landscape. How our bodies and the body of the earth have been mined. (Williams 1991, 10)

> The women closed their eyes. The time had come to protest with the heart that to deny one's genealogy with the earth was to commit treason against one's soul. . . . The officials thought it was a cruel joke to leave us stranded in the desert with no way to get home. What they didn't realize was that we were home, soul-centered and strong, women who recognized the sweet smell of sage as fuel for our spirits. (Williams 1991, 290)

There is an important link between women's health and rural health care. Both women and nature are poor in body and in spirit. Williams's book connects with the insight of ecofeminism that the subjugation of nature is linked to the subjugation of women.

Instead of using a traditional medical model for developing nursing practice, Augustana nursing students are educated to recognize the relationship between the dominant social structures and the impact of those on the lives of the oppressed, to use the telling and shaping of one's life story for the ethical task, and to take seriously the oppression of people through time as valid data and evidence. Stories heal, confront us with what we do not know, and bring us home to where we started. Williams's book provides an alternative strategy for teaching approaches to both health care and bioethics. This text helps us not only to reconstruct new ways of viewing health and illness but also to call for radical change in the way that humans live in and with the natural world.

There is an abundance of material both in religion and science and in biomedical ethics about issues surrounding beginnings of life and endings of life. However, something is missing in the literature. One can hardly pick up a journal, scientific or theological, without confronting questions about stem-cell research or the human genome project. Discussions abound as well about end-of-life concerns, ranging from the definition of brain death to the movements in palliative and hospice care. However, I have not found—and this has been confirmed with colleagues—that the literature around beginnings and endings is brought together in the same discussion, although both raise questions about what it means to be a human person, about the role of technology, and about the future of humankind.

My hope is to bring the research in biomedical ethics on beginnings and endings into conversation with each other to see how these boundary issues can inform each other. Such issues must be theologically grounded for Christian ethics, and I find that Hefner's proposal of the created co-creator is exactly the right framework for linking theology and ethics around these hotly debated issues.

The theological understanding of humans as created co-creators provides a framework for developing theological proposals concerning beginnings and endings of life. For example, at the beginning of life, prospective parents face difficult choices around pre-implantation embryo screening. The marriage between genetic and reproductive sciences changes our notions of what it means to be human, when life begins, the nature of family, and the role of technology. We raise questions like: When should genetic screening be offered and for what reasons? Should we treat the fetus in vitro? Reproductive sciences are changing the nature of what it means to be a parent, to be part of a family. Ethically heated issues such as sexual relations and the definition of life are examples raised by these new sciences and technologies. At the end of life, families face difficult choices about the continuation of care in terminally ill family members. Definitions of death have changed according to medical science and technology. In both cases, technological advances have both enhanced and complicated the ethical decisions we make about what life is and the role that humans have in creating and ending life.

How does the theological construct of the created co-creator help Christians to meet the challenge of reflecting upon the issues about life and death that confront us daily? Hefner locates theological reflection and action in the doctrine of creation, in particular the understanding of the image of God. He explains: "I have attempted to place works, morality, and praxis at the heart of the Christian faith, and I have done so by interpreting function and functionality as intrinsic both to the evolutionary processes of nature as interpreted by the sciences and also to processes of creation endowed with purposes by God, as interpreted by Christian faith" (Hefner 1993, 273). Hefner's proposal intimately connects faith and action, theology and ethics.

How then do we understand the human purpose of co-creating as we face issues about the beginnings and endings of life? We face new crises as we discover what we are capable of creating and destroying. Created in the image of God as co-creators, we must imagine new ways of thinking about our place in the world and our place with God. An area of life that demands such careful reflection is how we understand the relationship between technology, nature, and the beginning of life. The very words "artificial reproductive technologies" seem to go against our understanding of procreation. The lines drawn between natural and artificial no longer make sense. The lines between who is a parent and what a family is no longer work. How do we interpret co-creating in such a quagmire, especially when we assume that our purpose is to "birth the future that is most wholesome for the nature that has birthed us" (Hefner 1993, 27)?

Some people, for religious or philosophical reasons, object to artificial reproductive technologies such as in vitro fertilization (IVF) because they interfere with nature, raise questions about the status of the embryo, or

undermine God's predetermined plan for what a family should be. Yet, the same people may use antibiotics to treat pneumonia. What was once considered a new medical intervention is now a "natural" part of treatment. How do we decide when to use technologies or medical treatments? Simply dismissing them as "unnatural" hardly seems helpful.

Others object to IVF or other reproductive technologies because they treat embryos as objects and not subjects, because embryos do not result from a loving action but from technology that is market driven. And yet, the consumer's mentality of modern medicine is hardly confined to reproduction. Why are these particular issues so problematic? If one assumes that there is a simple or single answer, the multifaceted nature of the issues cannot be addressed. Decisions about whether or not to use artificial reproductive technologies need to be placed within frameworks like that of the created co-creator in order to interpret what the crisis is all about. Raising and clarifying the questions is part of the task.

For example, most feminists share the concern for autonomy held by most contemporary moral theorists. Women want choice and freedom with regard to reproduction. It would seem to follow that feminists would support the use of IVF. But a careful look reveals that some feminists question the nature of autonomy that is presumed for women by the dominant patriarchal culture. The procedures and technology of reproductive medicine are often controlled not by women but by a male medical establishment. Sherwin explains, "The supposed freedom of choice, then, is provided only to selected women who have been screened by the personal values of those administering the technology" ([1987] 2001, 538). The personal biases of the physicians could determine who receives treatment and how much it costs. For some physicians, a woman must be heterosexual and in a traditional marriage to qualify for IVF. While IVF might be available to women who are not married, it is not available to women who are poor. IVF is an expensive treatment.

A woman's autonomy also might be compromised by the society's pressure on her to reproduce. Sherwin explains that "women are persuaded that their most important purpose in life is to bear and raise children; they are told repeatedly that their life is incomplete, that they are lacking in fulfillment if they do not have children" ([1987] 2001, 539). Many women do not feel part of the mainstream of society unless they have children. A woman's worth is still judged biologically. However, children are not "property" of just their parents; ideally, everyone would help bear responsibility for the well-being of children. According to Sherwin, "in such a world, it would not be necessary to spend the huge sums on designer children which IVF requires while millions of other children starve to death each year. Adults who enjoyed children could be involved in caring for them whether or not they produced them biologically" ([1987] 2001, 539).

Artificial reproductive technologies raise the crisis of interpretation (nature/culture) about which Hefner is concerned. Do reproductive technologies best serve the interests of the human community or the rest of the natural world? This question needs further examination. The interrelationship of nature and technology can range from questions about the causes of infertility and the alienation of women from the very process of birthing to issues about access and cost of the treatments. A feminist ethic considers the social, economic, racial, political, and religious structures and relationships that influence the role, status, and health of women. To develop policies and protocols about artificial reproductive technologies is to consider the obligation we have to those who bear the burden of reproduction. Ethical decisions must begin with considering the impact that these technologies have on women's lives. Women must not only be a part of but should take leadership in decision making.

Co-creating in this context involves not only the physical procreation of giving birth but also active participation in the decision making about policies and procedures that arise from the technologies. Most reproductive technologies and matters are concentrated in the hands of those who do not do the actual bearing and rearing of children. For years, women were reduced to their reproductive functions. This compromises not only women but also men. Women must become much more involved in the political and medical arenas where decisions about their health are made.

To be a created co-creator is to be caught in an ambiguous web of freedom and responsibility. The freedom that identifies the created co-creator is not synonymous with the "autonomy" of Enlightenment individualism. "The appearance of a *Homo sapiens* as created co-creator signifies that nature's course is to participate in transcendence and freedom, and thereby nature enters into the condition in which it interprets its own essential nature and takes responsibility for acting in accord with that nature" (Hefner 2002, 5). No area of life bears greater witness to this relationship of ambiguity and freedom than the responsibility that comes with the use of reproductive medicine. We are asking: What is the nature of the family? Who is a parent? Are children a right, a responsibility, a privilege? Who should reproduce and why? What does it mean to be a human person in light of reproductive technologies? These questions are examples of what we face as we seek to give birth to our future.

Technology complicates, frustrates, and enhances our lives. We live in communities and cultures that create and construct the meaning of what it means to be human. To be human is to live in the freedom of ambiguity. The richness of the context in which we make decisions reflects the ambiguity of our creatureliness and of our freedom. Our freedom must always be interpreted in light of that context which is the cosmos writ large.

Note

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RETHINKING THE IMAGE OF GOD

by Anna Case-Winters

Abstract. The present ecological crisis imposes a rethinking of the relation between the human being and the rest of nature. Traditional theological articulations of this relation have proven problematic where they foster separatism and anthropocentrism, which give a false report on the relation and have a negative impact on thinking and acting in relation to nature. One place to begin rethinking is through an exploration of the affirmation that the human being is "made in the image of God," *imago dei.* Some ways of construing the theological meaning of this designation are more helpful than others. Science has recognized the extent to which the human being is not only dependent upon but even emergent from nature. We are made of the same "stuff" that makes up the rest of the universe. We *are* nature. The place of the human being is much more modest, recent, and precarious than usually acknowledged in theological reflection. New ways of interpreting our role within nature must evolve out of this new understanding. Philip Hefner has proposed that we think of the human being as created co-creator. His is a distinctive and promising contribution. This essay responds with both affirmations and friendly questions.

Keywords: anthropomorphism; created co-creator; genetic kinship; *imago dei*; progress; purpose; responsibility; self-transcendence; separatism; sin.

Philip Hefner's proposal that we think of the human being as a created co-creator is a fruitful one that has much potential for illumining the current discussion of the nature of the human being in relation to the rest of nature. Some traditional theological articulations of this relation have fostered a separatism and anthropocentrism that are untenable from a scientific standpoint and unhelpful in the current ecological crisis. It is useful at this

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time to revisit the roots of these articulations and revision the traditional doctrine of the image of God (*imago dei*). In this effort, Hefner's model of created co-creator offers a significant contribution.

The text that launched the whole classical discussion is the account of creation in Genesis 1 where it says that God created human beings in God's own image, male and female. In what does the *imago dei* consist? There is a range of viewpoints in the classical tradition on both what it really means to be created in the image of God and whether we can be said still to possess it after the fall.

Irenaeus located the *imago dei* in our human attributes of rationality and freedom. For Augustine it was a more dynamic quality of being in right relationship with God. Aquinas connected it with capacity for reason. Luther identified it with righteousness, by which he meant living life toward God. Calvin concurred with Luther; for him *imago dei* consisted in our orientation toward God.

These meanings fall into two somewhat different categories. One equates the image of God with attributes or capacities that are intrinsic to the human being as such: reason/rationality and freedom. Theologians who think in these terms are meaning *image* in the sense of a stamp indelibly stamped upon the human being as such and something therefore that cannot be lost. Theologians who think of *image* in more dynamic terms, as a way of living life before God or a quality of relationship with God or our orientation toward God, are meaning it more like the image we see in a mirror. If we turn the mirror away from the thing it was reflecting, the image can be distorted or even lost.

Why Correction Is Needed

I do not quarrel with the tradition in locating the *imago dei* in these attributes and qualities of life of the human being but rather with the habit of much of Christian theology in relation to these themes. Many seem to pursue the matter of the *imago dei* as a way of asking, What distinguishes the human being from nature? How are we special/different from the rest of creation? What sets us above and apart? When this is the way questions are framed, one suspects an agenda designed to establish human rights to rule and exploit the rest of nature. I think the whole approach to the *imago dei* needs to be reconsidered. Our present habits of thought have led to separatism and anthropocentrism, which have proven both untenable and dangerous.

There is an attitude that we are qualitatively different from the rest of creation and are in effect the center of the universe. The search for difference here, my hermeneutics of suspicion suspects, is really a way of asking how we are *superior to and more important than* nature. It is a quest for a grounding for our right to rule, our permission to exploit. We are in charge,

and what is here exists for us. Our relation to nature is an instrumental relation. Even the environmental movement grounds many of its arguments in terms of human survival acknowledging our very real dependency on our ecosystems. Nature is first and foremost a set of natural resources existing for our use. If we conserve these resources, we do so not for their intrinsic value but so that we will be able to go on using them indefinitely. This way of thinking has had disastrous consequences for the way human beings related to the rest of nature, bringing us to the present ecological crisis. The habit of looking to our theological definitions of the human being as a way of shoring up our sense of difference and centrality may be a dangerous habit, one we need to break.

Separatism and anthropocentrism lose credibility in the light of what we know from science about the human being. What science has discovered presses us to reconstruct our theological anthropology.

Continuity between Human Beings and the Rest of Nature. There is more that connects us with nature than there is that distinguishes us. Our true relation is obscured by language we commonly hear—that we are "dependent upon" nature for our sustenance. The relation is much deeper than that. We have learned from contemporary science that we are in and of the natural world, coming to be, like all other life forms, within the long process of evolution from simpler life forms. We are composed of the same "starry stuff" that makes up the rest of the universe. We emerge from "preceding natural processes that include cosmic events (the appearance of physical elements in the galactic furnaces), as well as biochemical (the emergence of life), genetic, and neurobiological events" (Hefner 2002). There is an unbroken continuity with the rest of nature; separation is a false report on reality. We are part with all else of the rich, diverse, complex, and evolving web of life that has been emerging over eons on this planet. What made everything from the butterflies to the belugas made us, too. We are in this sense "created," and we are not so different. We *are* nature.

The things that distinguish us are a matter of degree. This is underappreciated. Even the rationality, freedom, and relationality that are ours are not ours exclusively. Some renderings of the God-human being-nature relations place God and the human being on one side of a great divide having a monopoly on spirit, while all else is on the other side as purely material: nature as backdrop for the God-human drama. However, science paints a very different picture. We see degrees—quantitative rather than qualitative distinctions. In fact, as Nancy Howell has pointed out (2002), the very areas that historically have been assumed to make us distinctive from other primates—our genetics, language, culture, and morality—turn out to be similarities rather than differences. We share 98.4 percent of the same genetic material with our closest relatives. We are

closer genetically to chimpanzees than gorillas and orangutans are. In terms of language, while chimpanzees are morphologically different and therefore cannot speak as we do, they are capable of learning sign language, and they teach it to their offspring, who, it is reported, sign more to their friends than to their mothers. In terms of cultures, chimpanzees of the seven regions in Africa show similarities in practice and behavior but also differences that seem to be culturally transmitted. In terms of morality, there is evidence of a whole range of things from sympathy and empathy to the ability to devise and carry out a deception.

Our Place Is Much More Modest than We Have Heretofore Imagined. The evidence of science reveals that we have made a rather late appearance on this scene. Many species have come and gone before us. If we are at the center of it all, what about those eons and the myriad creatures that were here before us? Was cosmic meaning and fulfillment just on hold until we came along? How unlikely it seems.

We have a rather precarious existence. Russell Merle Genet (1998, 2) has pointed out that, as a species,

> we consider ourselves to be highly successful, but in actuality, we are not. If one is coldly objective about life—about success—it is biomass that counts. Among animals, the insects, not mammals (let alone mere humans) are the biomass winners. Animal biomass, however, even all of it rolled together, is inconsequential compared with plants. This is not the worst of it, however. Recent research has revealed the actual winners of our planet to be subterranean bacteria.

Stephen Jay Gould notes that complex life forms like ourselves are really at a disadvantage. Our very complexity makes us easy prey to the mass extinctions that periodically plague the planet (Genet 1998, 2). Even if we survive until our Sun goes out with a bang or a whimper, how can it all have been about us with our late appearance and precarious existence?

We are an infinitesimally small part of it all. Those who study the character of the larger cosmos class human beings with the heavy elements. Most visible physical reality is lumped together as "things heavier than helium" in a broad category called "metals." This whole category makes up only .001 percent of what is there. We are almost "not there" in the grand scheme of things. We may ask, with the psalmist, "what, indeed, are mortals that God is mindful of them?" (Psalm 8:4 NRSV)

Our place seems smaller still when we consider that we may not be alone in the universe. With the discovery of other planetary systems around nearby stars, some wonder whether there might not be myriad other planets with myriad life forms. There is a vast cosmos out there. If we are the main show, it would seem that, as the theologian in the movie *Contact* was wont to say, "There is a whole lot of wasted space out there."

Alternative Resources in the Tradition. Given these realities, one wonders how the dominant tradition came to shape a theological anthropol-

ogy so intent upon setting the human being apart from and above it all. This direction in a Christian theology of human nature is not inevitable, for there are alternative readings available in the tradition. For example, when it is affirmed that human beings are "created in the image of God," do we lose sight of the reality of being "created" (just like everything else) and latch on to our being "in the image of God"?

Old Testament scholar Theodore Hiebert, in his book *The Yahwist Landscape: Nature and Religion in Early Israel* (1996) has revisited the two accounts in Genesis of the creation of the human being. Theologians have rather decisively favored the first account over the second. It is the Priestly account, wherein the human being is said to be made in the image of God (Genesis 1:26–28), that has become our theological preoccupation. The Priestly writer held a perspective that viewed the human being as a godlike being in relation to the rest of nature, dominating and ruling over all else. The Yahwist account found in Genesis 2 presents a very different picture. In verse 7 the human being is said to be made "from the dust of the ground" (NRSV). The Yahwist writer speaks from an agrarian context wherein the human being is very much a part of and dependent upon natural processes. The perspective is of oneness with the earth and all living creatures. The human being tilling the soil is the servant of the land and not its master.

Why have we not listened as attentively to the Yahwist writer as to the Priestly writer? Why has the insight that we are "dust" taken a back seat to the insight that we are "made in the image of God"? Can it be because the Priestly account aids us in making theological claims that we are set apart from and above the rest of nature, whereas the recognition that we are dust calls us back to a much humbler standpoint within nature? Perhaps another look at Genesis 2 would be profitable.

There may very well be many such untapped resources in the tradition that would underscore our humble place as a part of nature and the intrinsic value of the rest of nature. For example, there are hints in John Calvin of something less anthropocentric. In his theology, particularly in the Commentaries and the Sermons, it is clear that God has a relation to all of creation, not just to human beings. He speaks of nature as the "theater of God's glory."[1] The human being has an important part in this theater,[2] but we are by no means the whole show. The whole of creation is a locus of divine revelation[3] and providential activity, and the anticipated eschatological consummation includes not only the redemption of humanity but also the restoration of all things—a new creation.

Even granting the classical definitions of the *imago dei*, there is nothing that requires the peculiar development that our theological elaborations have taken—the practice of taking these descriptions as a means to separate and elevate the human being from the rest of nature. Whether we think of the image of God in terms of intrinsic capacities such as reason/

rationality or the quality of our living in relationship, these admit of more and less and could be seen as placing the human being on a continuum rather than in absolute distinction. There are degrees of rationality and degrees of capacity for relationship.

The resources of contemporary process theology may be helpful in drawing this out. Enhanced rational and relational capacities do not need to be perceived as separating us from the rest of nature in some qualitatively different sense. These capacities admit of a more and a less, a continuum of gradations. With regard to rationality, for example, we are helped by A. N. Whitehead's notion of panpsychism (now being helpfully recast by David Griffin as panexperientialism), which sees mental and physical poles in all things, though in varying degrees. With regard to relationality, the process conviction of the sociality and relativity of all things is pertinent. The claim is that human beings, like every other reality, are co-constituted by their relationships. Relations are internal. To the degree that humans may have a greater rational capacity (a stronger mental pole) or a greater capacity for relation (since we are more self-transcending), we may manifest the *imago dei* in ways that are distinguishable quantitatively. This does not have to entail our being qualitatively different from the rest of creation in the way that has proven so problematic.

Hefner's Distinctive Contribution: Affirmations and Questions

Affirmations. Hefner's proposal that we think of the human being as created co-creator has among its many advantages a corrective potential. It puts "created" first. Our ontological dependency and our status of being like the rest of nature is underscored by this step, with all of the theological implications that attend that status. This is a useful course correction when laid alongside other theological anthropologies. The double aspects of our being both "dust" and *imago dei* are better balanced in Hefner's proposal and its elaboration.

Hefner reframes the question. Instead of asking about the *imago dei* in order to discern how the human being is to be set over and apart from the rest of nature, he asks in order to discover what the human being's particular role may be, what we distinctively have to offer to the rest of nature. The motivations of the question and the outcomes are decidedly different. The separatism and anthropocentrism are effectively countered.

Hefner's proposal is a creative joining of the two traditional categories of image as stamp and image as reflection. On the one hand, we are *created* and in that sense "stamped" with certain qualities, rationality and freedom, that attend human being as such. On the other hand, in the concept of *co-creator*, we have something more dynamic, which has to be lived into if we would reflect the image of God. This is an image we are to reflect by

living in relation with (turned toward) God and others. It is a calling into relationality with God, other human beings, and the rest of creation. With this more dynamic aspect there is the prospect for human beings to "turn away" and become "estranged from their own normative nature" (Hefner 2002). Hefner's proposal embraces attributes of rationality and freedom as well as qualities of life like relationality—in Hefner's own framing, aspects of our being that are genetic as well as aspects that are cultural. We turn out to be in some sense "gifted" and in some sense "self-made."

The descriptive potential of Hefner's proposal for understanding the nature and purpose of the human being is significant. In the larger discussion there is need for a metaphor that will illumine both who human beings are (in relation to God and the rest of nature) and what they should do as the especially free and rational creatures that they are. This model works well in this connection. In some ways, the nature and purpose are one—the "ought" can be derived from the "is" (1993, 31). Hefner is clear that we are related to the entire history of the universe and its evolution: "We are creatures who have emerged from the eons of evolutionary processes that preceded us" (2002, 1). If relationality is constitutive of our very being, then it is both our nature and our calling to live in relation. Estrangement and self-centeredness are not normative for us. Readings of "sin" as a failure in relation are given a fuller articulation in the symbol of created co-creator. We are created for relation; it is our nature and our purpose.

Another substantial contribution of Hefner's proposal of created co-creator is its potential for engaging wider circles of conversation, among them circles of scientists and feminist theologians. He fully accepts the insights of science regarding the nature of the human being. This makes possible a more constructive engagement with scientists in thinking through the nature of the human being. Furthermore, the discoveries of science prove most illumining for the current project of discerning the "is" and "ought" of the relation between the human being and the rest of nature. Key among these is the discovery of the extent to which human beings are "natural" beings: "The sciences provide us with a relentlessly vivid message concerning how humans are related to nature: We are constituted by natural processes that have preceded us, we have emerged within the career of nature's evolving processes, and we bear the indelible marks of those processes. In short, we are indissolubly part of nature, fully natural" (Hefner 1993, 64–65).

Hefner uses the model of "genetic kinship" (1993, 65) to express the full implications of what science has uncovered. This is a relationship that is not a function of our choosing to be related to nature or even of our dependency upon our natural environment for our continuing existence. It is rather a genetic inheritance internal to us—an internal, not an external, relation. While we may make a case for cultural inheritance as well as

genetic inheritance as formative for the human being, genetic inheritance has a certain priority. We, along with the rest of nature, are all made of the same "starry stuff" (dust?) and did not make ourselves from cultural sources.

Hefner's proposal engages feminist theologians in the widening circle of conversation, especially in the places where his proposal presses beyond the understandings of sin that are most prevalent in Christian tradition. "We are sinners in that we do not and cannot exercise our created co-creatorhood as creatures of God who reflect God's image" (Hefner 2002). Such a view can join in coalition with feminists who insist that sin as pride does not tell the whole story. Given our socialization in patriarchy it tells *his*-story but not *her-story.* Self-negation and enmeshment may hold as many pitfalls for the human being as pride and self-centeredness do, and in patriarchal cultures women are more prone to this failing. Hefner's reading sees sin manifest as much in underachieving as in overreaching, in not living up to our potential and becoming all we are meant to be, in not taking responsibility and agency where it is rightly ours. This is what feminists have been saying.

Another feminist agenda item, that of subverting the dominant dualisms, receives assistance here as well. The dualism named in the old adversarial relation of "man against nature" is undercut, as is any way of thinking that would oppose culture to nature. In the human being, we have cultured nature—natural creatures that are self-reflective, self-transcending, predisposed not only to understand our world but also to intervene in it and reshape it.

Questions. Hefner's proposal that we think of the human being as created co-creator is a workable option, helpful on many fronts. There are questions that remain. These I introduce here in the interest of furthering his very fruitful proposal.

1. How continuous is the continuity between the human being and the rest of nature? Once the old dualisms are laid to rest, the nature of the relation must be reconsidered. Several questions arise for me. I wonder whether more of nature than human beings might be thought of as cultured and co-creative. Insofar as higher primates, for example, share much genetic information with us and have a relative freedom and (some would argue) a degree of self-transcendence, how do we think about their status? If it is a question of degree and we see a continuity along a spectrum, how continuous is the continuity? Consider Frans de Waal's work with higher primates. He claims to find "intense sociality and conviviality" and the existence of "genuine kindness" (de Waal 1996, 5). He contends that moral behavior goes far back in evolutionary history and is "neither a recent innovation nor a thin veneer that covers up a beastly and selfish makeup" (p. 218). Can human beings share with other creatures, by degrees at least, in the created co-creator status?

2. To what degree is freedom the human condition? This is asking the same question (that of our continuity with the rest of nature) but from the other direction. I wonder whether we overestimate the extent of our freedom. We experience ourselves as making choices as self- and world-creating beings. However, we make these choices out of will and a nature that is deeply constrained by genetics and environment. I guess I am arguing for something like a biocultural bondage of the will. Hefner gets at this from time to time, noting for example that "genetic and environmental factors are interwoven on the loom of constraint and freedom" (Hefner 1997, 199).

3. Is the boundary of Creator/created transgressed? Is that a problem? Traditional notions have left an absolute divide between Creator and created. Is that boundary transgressed as the human being is declared co-creator? Is Hefner willing to go along with those of us in the process company to think in terms of creativity as a more general term that embraces both God's activity and ours?

4. How does "created co-creator" improve upon "steward of creation"? This is a question I am asking myself as well as Hefner. Even the most generous and revisionary interpretations, for example Douglas John Hall's reinterpretation of dominion as "stewardship" (1986), still assume a separation wherein the human being is set over and above nature in a divinely authorized managerial relation. How is the custodial managerial relation of stewardship that both Hefner and I reject fundamentally different from the co-creator role that we both affirm? Either implies a special relation and a degree of power over and responsibility for the rest of nature. It may be argued that "stewardship" is at one and the same time too much and too little: too much in that it seems to authorize and bless our being in charge, subduing and having dominion, and too little in that "stewardship" is not an adequate description of such human enterprises as genetic engineering. How can we more fully articulate the difference between being a steward and being a co-creator?

5. Does the close association of human capacities/purposes with the purpose of nature risk a return of anthropocentrism? Some of Hefner's discussion of the role of human being and what the human being can contribute distinctively borders on saying that nature's "purpose" is the evolution of conscious, intentional beings like us, that in fact the evolutionary process has progressed toward us. It might be more fitting to argue that *one* of the purposes of nature seems to be the evolution of creatures like us, since that is what has happened. This is a more modest claim and would not lend itself to either the myth-of-progress way of thinking or the anthropocentrism that could reenter by the back door.

Regarding the purpose-of-nature discussion, now and then Hefner seems to be saying that God's purpose in nature was to bring forth beings who can be these "co-creators." Gerd Theissen reads Hefner as saying that "God

has created this evolutionary process in order to bring forth human beings as God's free co-creators. . . . Thus, they fulfill the will of God for the entire creation" (1994, 391). If this is Hefner's meaning, there is indeed risk of falling back into the anthropocentrism he has elsewhere challenged. Hefner does argue that the teleonomy of a being is to be read from the natural equipment provided to that being. Clearly the human being is capable of a high level of intentionality (and therefore freedom, adaptive plasticity, and culture) due to our highly developed central nervous system. But what about other creatures? Should not their purpose and meaning be read from *their* particular equipment rather than privileging the capacities of the human being as revealing God's purpose with all of nature? Otherwise, it seems that only the human being can fulfill the purpose of nature and that the other creatures, differently equipped, do not have distinctive purposes. If human beings destroy themselves in a nuclear holocaust, will God's project have failed utterly?

It seems important to affirm that nature in its rich diversity of forms has multiple purposes. This would be a more consistent application of Hefner's own principle of teleonomy. Other resources for theological reflection on nature's purposes might be drawn in from Christian tradition. Augustine's "principle of plenitude" or process theology's "maximal harmony and intensity" might prove helpful in this connection (Enchiridion v.2.1; Whitehead 1978, 84ff.).

6. Is the assumption of evolution as purposive and progressive borne out by the data of science? Langdon Gilkey has challenged Hefner's proposal as being "a covert expression of nineteenth century liberal beliefs in progress" (1995, 293). While this may overstate the matter, those assumptions that leave Hefner vulnerable to such a charge might profitably be reconsidered—the assumption that evolution is purposive and progressive and the optimistic reading of human culture and exercise of freedom.

There are underlying questions arising from contemporary evolutionary theory concerning whether evolution is progressive or even directional in nature. Michael Ruse claims, "The idea of evolution is the child of the hope of progress. Like the parent, it too incorporated the hope of the upward climb" (1996, 72). However, as Terrence Nichols has demonstrated, the idea of progress has been mostly dismissed in modern evolutionary thought (2002, 194). It is rare in contemporary evolutionary biology to think in terms of progress toward a goal (humanity). Improvement of adaptive fit is admitted by some (Richard Dawkins), and a building upon preexisting order to achieve a "higher degree of sustained complexity" is admitted by others (E. O. Wilson, as quoted in Ruse 1996, 512–13). But generally natural selection is considered a "blind" process. As Dawkins puts it,

> Natural selection, the blind, unconscious, automatic process which Darwin discovered, and which we now know is the explanation for the existence and appar-

ently purposeful form of life, has no purpose in mind. It has no mind, and no mind's eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of "watchmaker" in nature, it is the *blind* watchmaker. (1987, 5)

Even Gould, who sees natural selection as a necessary but by no means sufficient principle for explaining the full history of life (1997, 1022) and finds purpose in the sense of agency of the organisms involved, still refuses notions of progress in the overall process. He holds that progress is a statistical illusion fostered by humanity's anthropocentric hopes (1996).

It is debatable whether and to what extent the human being in our creation of culture and exercise of freedom represents progress. The evidence is ambiguous. Indeed human beings are more free and consequently more responsible than other creatures. However, altruism does not tell the whole story of the exercise of that freedom. High cultures are capable of great injustices, cruelty, and even genocide.

Here and there, the assessment of the human condition feels a little optimistic (especially to a Reformed theologian like myself). Hefner expresses a view that the crises of the human race can be traced to "our incompetence in constructing adequately the cultural systems of information and guidance that we depend on" (1997, 198). The inadequacy of our cultural guidance systems does not seem to convey the seriousness of the human problematic named theologically under the category of sin. It does seem an optimistic reading that if only human beings could construct more adequate cultural systems of information and guidance, the problem could be overcome. Such optimism has been severely chastened by historical realities of the twentieth century, including two world wars, the Holocaust, and the dropping of the atomic bomb. The contemporary resurgence of interest in the theological notion of original sin may stem from the tragedies of our history. There is a renewed sense that human beings are born into ambiguities that we did not ourselves create and from which we cannot extricate ourselves.

Hefner examines proposals in *The Human Factor* (1993) regarding the biosocial evolutionary etymology of such religious concepts as sin and guilt. Don Campbell has proposed that this phenomenon arises from the tension of "human culture contra selfish human nature" (1976, 187). It is pressure from cultural evolution that causes genetically predisposed competitors to function as cooperators. This is an interesting proposal and certainly would have some explanatory value, but I agree with Hefner that the themes seem to be imported from free-market capitalism in a way that makes competition seem natural and sets up a new dualism between our "cooperative culture" and our "competitive nature." The position risks dualism, and that concerns Hefner (1993, 135).

I would add to Hefner's reservations about Campbell's analysis the objection that recent work with higher primates does not bear out his as-

sumptions. De Waal insists in his *Good Natured: The Origins of Right and Wrong in Humans and Other Animals* (1996) that cooperation is not a "thin veneer" covering over our "natural" beastly selfishness. Symbiosis and cooperation are in fact manifest all the way down in us or all the way back in our genetic heritage. Competition and cooperation are both present in our complex social systems. Does culture always teach cooperation? Do genes always teach selfishness? Why propose that we are overcoming our natural selves when we are altruistic? Why not assume that being altruistic is also in our genetic repertoire? Such proposals are reminiscent of theological discussions wherein it was debated whether original sin is a biological inheritance or a social inheritance. Do we sin because our first parents did, and this is transmitted to us in their procreation, or do we sin because we are born into sin? It would seem that both our selfishness and our altruism are both genetically and culturally transmitted.

7. Can the "ought" be derived from the "is"? Hefner believes that the "naturalistic fallacy" is itself a fallacy (1993, 58). The "ought" can be derived from the "is." This strong statement may need more nuancing. For example, if it is the case that in most cultures around the world and through the centuries women have been assigned a secondary status, does this "is" imply an "ought"? While I concur with Hefner's basic assumption that all values finally receive their validity from being rooted in and in harmony with the way things really are (1993, 57ff.), I question whether anyone can get at "the way things really are." The postmodern context invites acknowledgment that the "is" cannot simply be read off the face of things. Each reading is a construction, in part a function of social location and interests. From the standpoint of divine intentionality, one might indeed see into the deeper reality at the heart of things. That view of the "is" might be sufficient to guide the "ought." It is not that we should not aim toward such a vision, just that the difficulty of achieving it should not be underestimated. Any claims about the "is" are best stated modestly as the constructions they are. Hefner's particular reading of the "is," that sees altruism at the heart of things, is compelling. It is a vision that claims self-giving as "natural" for the human being and our true calling. One admissible test of competing constructions might be the pragmatic one: What does this reading cause people to do? Hefner's reading would stand up well under this test.

Conclusion

Hefner's proposal of the created co-creator offers tremendous corrective potential in the current discussion. It effectively counters the separatism and anthropocentrism that has predominated. He has in fact reframed the question of our existence—and therefore the approach to theological concepts like *imago dei*—by asking not how human beings are separate/differ-

ent and better than/over-and-above the rest of creation but rather what distinctive contribution human beings may make to the rest of creation.

Hefner's proposal of the human being as created co-creator provides a way of thinking about the *imago dei* that has a number of advantages. It is congruent with the scientific picture of the human being, it names our full integration with the rest of nature, and it acknowledges the special responsibility that attends our enhanced capacities in rationality and relationality. Human nature as well as human purpose are given meaningful content here.

The "created" component in this designation can look in two directions. It can embrace the affirmation that we are created *by God*; we did not make ourselves. Our life is a gift that we have received; we live in ontological dependency. It also can acknowledge that we are created *by nature*. That is, we came to be in the ordinary process of nature, we are thoroughly biological and utterly connected to all that is nature—we *are* nature, we are "dust."

The "co-creator" in this designation recognizes our reality as an emergent consciousness, as nature become aware of itself, as beings of enhanced capacity for rationality and relationality. As a consequence, we are more free and therefore more responsible—we are *imago dei*.

Notes

A version of this essay was delivered at the Chicago Advanced Seminar in Religion and Science, "The Created Co-Creator: Interpreting Science, Technology, and Theology," organized by the Zygon Center for Religion and Science, Spring 2002.

1. "For our salvation was a matter of concern to God in such a way that, not forgetful of himself, he kept his glory primarily in view, and therefore, created the whole world for this end, that it may be a theater of his glory" (Calvin, Consensus Genevensis CO 8:294).

2. Although both Karl Barth (1936–1962) and Calvin (1958; 1959) speak of creation as a theater of God's glory, they use this image very differently. For Calvin creation provides the stage upon which God's wondrous works are displayed. The human being is a spectator in relation to this witness to God's glory, blind spectators though we be. But for Barth the human being is very much on stage. Creation is the stage on which the drama of the God-human relation will take place. Creation's role is diminished to that of a backdrop. The history of the covenant of grace is the main thing: "provision has been made and is continually made for the history of the covenant of grace, for time, space and opportunity for the divine work of grace and salvation" (III/3, p. 48). Creation is the external basis of the covenant. "But the theatre obviously cannot be the subject of the work enacted on it. It can only make it externally possible" (III/3, p. 48) When it comes to creation as such, it is fashioned as a "dwelling place" for human beings (III/1, p. 157) and bears its value by virtue of this function, not in its own right.

3. "In respect of his essence, God undoubtedly dwells in light inaccessible; but as he irradiates the whole world by his splendor, this is the garment in which he, who is hidden in himself, appears in a manner visible to us" (Calvin 1958, Psalms 104.1).

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THE CREATED CO-CREATOR: WHAT IT IS AND IS NOT

by Gregory R. Peterson

Abstract. In this article I briefly assesses Philip Hefner's concept of the created co-creator by considering both what it does and does not claim. Looking at issues of reductionism, biological selfishness, biology and freedom, and environmental ethics, I point out strengths and weaknesses in Hefner's conception of the created co-creator.

Keywords: created co-creator; environmental ethics; freedom; Philip Hefner; sociobiology;

There are few theological ideas that have caught on so well as that of the created co-creator. Frequently cited, Philip Hefner's succinct phrase describing the place of humanity in the created order has inspired many. At the same time, it also has offended some, who see in it too much presumption about the human role in creation. Popularity (and notoriety) is important for the spread of ideas, but it also is inevitably distortive. The phrase itself—created co-creator—is pregnant with possibility, catchy both in its alliterative appellation and in its succinct expression of what it is to be human. Yet, like Thomas Kuhn's use of the word *paradigm*, it sometimes is taken to imply something more or even something different than its original intent. When all is said and done, what actually is the created co-creator?

What follows is a brief analysis and, to a lesser extent, assessment of Philip Hefner's concept of the created co-creator within the context of his larger theological work, most notably *The Human Factor* (1993). It is an assessment with a twist, for, while I certainly wish to understand what the notion of the created co-creator is, I will mainly proceed by analyzing what it is not. This may seem peculiar, but the reasons for this should become

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clear. On one hand, clarifying what the created co-creator is not distinguishes the theological vision intended by Hefner from ways that it is sometimes used by others. On the other hand, by considering what the created co-creator is not, it can also be seen how Hefner intends the created co-creator to be understood, which is sometimes hidden by the caution with which he has explored the idea. Hefner's theology of the created co-creator is interesting, suggestive, and intriguingly incomplete. Considering the alternatives may, at the very least, serve to help suggest future directions for exploring the concept.

What the Created Co-Creator Is

Hefner first laid out his understanding of humankind as created co-creators in an article on the doctrine of creation, part of a larger introduction to theology designed for seminary students (1984). In both this and later works, it is clear that the label *created co-creator* is intended in no small way to denote what it means to be created in the image of God. Recognizing this at the outset is to recognize the theological tradition behind the concept, which is sometimes treated simply as a new idea of humankind's relationship to God and world. While there is much that is new and refreshing in Hefner's interpretation, it also is important to note the theological legacies that stand behind it.

Created co-creator is a thoroughly theological concept. By this I do not mean simply that God is lurking somewhere in the background but that the concept of created co-creator is intended to provide an ultimate and even normative account of human nature. While informed by the physical, biological, and social sciences, it nevertheless dares to go beyond them in order to portray humankind and reality the way they "really are," an expression that Hefner uses several times in *The Human Factor*.

To be a created co-creator is, first of all, to be created. Hefner understands this in both a scientific and a theological sense. Scientifically, we are created in the sense that we, as individual human beings, do not appear on the scene *sui generis* but rather are born to a set of specific parents with specific backgrounds. We are spiritual beings, influenced by community and heritage, as well as biological beings, influenced by the laws of genetics and evolution. Theologically, we are created in the sense that we are not, to use the language of Paul Tillich, the ground of our own being. Our ultimate source lies outside of ourselves, and our nature in turn points to and relies on this ultimate source. In the Christian tradition, this ultimate source is understood to be the Triune God, who is in relation to nature and history in quite specific ways.

We are not simply created creatures, however. We are created creators. More so than many, Hefner emphasizes the category of freedom, although

this is understood in an empirical rather than a metaphysical way. Whatever the case may be metaphysically, we empirically experience freedom as part of our nature; we exercise at least some modest control over our own lives and cannot avoid the necessity of making decisions. Beyond this empirical (and one might say scientific) level, we may also be said to be theologically free. On Hefner's approach, not only are we empirically free in relation to our immediate surroundings, but we exercise considerable freedom in relation to God, the ultimate source of all. This is, it must be noted, a much more dramatic and significant claim, and it is from this theological understanding of freedom that the concept of created co-creator draws much of its insight and importance. At the same time, to be a created creator implies a necessary tension. In Hefner's work, to be created is to be natured. That is, there is a fixity to human nature that cannot be escaped but that is nevertheless in relationship to the very freedom we exercise. To be a created creator nearly implies paradox, for it asserts and denies limitation at one and the same time. On Hefner's analysis, we are both determined and free—an important but seemingly self-contradictory insight.

Hefner asserts that we are not only created creators but created co-creators. The *co-* is in some ways the most important, intriguing, and troublesome term. It is also the most theological, for it implies not simply that we are creating in and of our own right but that our creative acts are in cooperation with God's creative acts in a way that suggests partnership rather than subordination. To grasp the significance of this, it is useful to contrast Hefner's "co-creator" with the safer "sub-creator," used by Christian author and philologist J. R. R. Tolkien (famous for writing *The Hobbit* and *The Lord of the Rings*) in a long and well-regarded essay, "On Fairy-Stories" (Tolkien 1984). Tolkien's sub-creator has theological connotations similar to Hefner's co-creator. But the implications are subtly and importantly different. To sub-create is to imitate or to work on what has already been thought out. It may imply initiative on the local level, but it reminds us that the master task always belongs to God.

The implication of co-creator, however, is radically different, for it suggests that we are as much in control or responsible for creation as God is. It suggests that there is no blueprint for the future; the future is open, not determined. This sort of openness, radically shaped as it is by human freedom, is as thrilling and terrifying as the rocky course of human history, with considerable significance for thinking through issues of theodicy. The *co-* is suggestive of not only the role of humanity but also the nature of God, for it implies a God who radically values freedom over control. The deceitfully diminutive *co-* is in some ways the most radical and least appreciated part of Hefner's project.

What the Created Co-Creator Does Not Imply

This incomplete sketch gives some idea of what the created co-creator is. The idea of the created co-creator is rich with interesting, interpretive possibilities, a number of which Hefner has developed. It is only when the alternatives begin to be fully considered that the implications and impreci-sions of Hefner's work start to become clear.

It Does Not Imply that Theology is Reducible to Natural Science. The first response might be, "Why think this?" After all, it is clear that Hefner is not a starry-eyed reductionist but is clear about both the potentials and some of the perils of modern science. Yet, he also employs a symbolic approach to theology whose precise meaning is at times ambiguous, especially with regard to the interpretation of the sciences. In *The Human Factor* this is complicated by Hefner's conscious unwillingness to lay out a sophisticated doctrine of God. His reasons for doing so are several, but they can give the impression that perhaps there is no doctrine of God behind the work at all. This impression, for some, may be reinforced by his later chapters, which endorse a (cautiously) functionalist approach to understanding myth and ritual. Read in a particular way, this can be erroneously construed as implying that religion can be reduced to function, rather than understanding that, however we understand the source of religion, religion must necessarily perform functions in society if it is to perpetuate itself.

The main problem here seems to be Hefner's metaphysical shyness. This shyness has something to commend itself, because it recognizes the difficulty of speaking of God in a rigorous way, particularly in the intellectual context of the late twentieth century. Metaphysical shyness also can allow a multiplicity of readings, implying that the created co-creator is compatible with more than one theological perspective. It also clearly taps into the tradition of both Eastern and Western Christianity that emphasizes God's mystery and incomprehensibleness.

Metaphysical shyness should not, however, be taken to imply or endorse a reductionist approach. Hefner's resistance to reductionism may not be so clear in his metaphysical commitments, but it is very clear in the soteriological implications of the created co-creator. When Hefner lays out the "hard core" of his theology (following Lakatos), it is clear that the soteriological character of the created co-creator is at the center. Here, the created co-creator is not simply a description of how human beings behave, it is a prescription for how we should act and think of ourselves. This prescriptive character of the created co-creator is most explicit in the final chapters of *The Human Factor,* where Hefner links the created co-creator to a Christian understanding of altruism that prescribes a degree of cooperation beyond that acknowledged in the biological sciences. Hefner even states: "Theology suggests that theories of epigenetic rules or strate-

gies of self-interest are not enough to complete our understanding of altruistic love; we require also ways of discussing the hypothesis that altruism is an intrinsic value, rooted in the fundamental character of reality" (1993, 209).

This passage may be one of the most significant statements concerning what the created co-creator is about. Facilely, it can be read as a statement of conflict between theology and science. Biological studies of cooperation suggest that, within an evolutionary perspective, kin altruism and reciprocal altruism are evolutionarily stable but stronger forms of altruism are not. It would seem to me, however, that a better way of understanding Hefner's intent is to read this statement as an explication of the relation of religion and science in a way that suggests their proper domains and extents. As a science with a particular purview, biology can explain certain kinds of cooperation but not others. Because theology's task is far wider, concerning as it does the ultimate nature of things, its perspective goes beyond what the studies and experiments of biology establish. It is not that biology is wrong but that it is simply incomplete, and incomplete in a way that has dramatic importance for understanding human nature and prescribing human purpose.

It Does Not Imply that Biology Is Evil, Culture Good. An important review and critique by Langdon Gilkey (1995) argues that Hefner's account of human nature is flawed. In Gilkey's view, Hefner divides human nature in two: biological nature is the source of selfishness and therefore (in a sense) sin, while our goodness comes from the influence of culture and cultural norms. Gilkey's critique has been influential, but a careful reading suggests that he is wrong. In places, Hefner does make clear that there is a certain artificiality to the gene/culture split, noting that, while the dualism is useful, it is not absolute (e.g., Hefner 1993, 102–3). He also notes that, although much of selfishness can be seen as being rooted in our evolutionary history, it is quite clear that cultural evil exists as well. Nevertheless, it is easy to get the impression that such a split, with the consequences that necessarily ensue, is implied. Why is this?

It seems that the fault lies not so much with Hefner's final analysis as with the scientific sources that he uses to buttress his position. Although Hefner does not conclude that genes are the source of evil and culture the source of good, many of his scientific sources do. In several places, Hefner cites the work of psychologist Donald Campbell (1975), who is well known for arguing that religion has historically played a positive role in society by providing well-winnowed wisdom to counter the selfish impulses urged on us by our genes. On Campbell's view, our genes drive us to selfish and, in a social context, almost self-destructive behavior. What we call good is supported by cultural traditions, and religion plays a particular role with its constant injunctions against self-gratification and exhortations toward self-sacrifice.

In citing Campbell, Hefner is citing not an idiosyncratic position but one that has been supported in various ways by a number of scientists, most notably (and notoriously) the founders and followers of sociobiology. Sociobiology was conceived by E. O. Wilson (1975) as a discipline devoted to explaining social behavior in general and altruistic behavior specifically. Wilson and other sociobiologists see selfishness as the biological norm and altruism as the apparent exception to be explained as a special and complex form of selfish behavior. In human beings, culture is understood to be the source of altruistic behavior. For some sociobiologists, there may even be a sense in which culture can defy the selfish impulses of genes (Dawkins [1976] 1989). This implied selfishness of human nature also has been taken up by evolutionary psychologists in their reworking of sociobiology to include psychology and cognitive science (Barkow, Cosmides, and Tooby 1992).

Hefner's work is replete with references to Campbell, Wilson, Richard Dawkins, Jerome Barkow, Leda Cosmides, and John Tooby, among other like-minded scholars. As a result, it is easy to get the impression that Hefner agrees with the sources that he uses, but this is not the case. Rather, like many other scholars in both religion and philosophy, Hefner seems to be critical, if quietly so, of the claims of sociobiology when applied normatively and even descriptively to human nature. This is an important point and worth amplifying. Many scholars in the science-and-religion dialogue have been quite loud in their critique of sociobiology (Peacocke 1986; Stenmark 2002). Some have taken such critique to an extreme, implying that sociobiology has no scientific basis whatsoever and should be dismissed as a revival of social Darwinism or worse. That Hefner engages these scholars at all indicates that he is not of the same mind, and in my estimation he is at least partly correct. Whatever sociobiologists may say in their popular works (which often tends toward the extreme), the research that undergirds sociobiology is no passing fad and must be taken seriously.

At the same time, it is important to note that sociobiology as a discipline has often skewed valid research to emphasize genetic self-interest and selfishness in a way that has unpleasant moral connotations. While Dawkins and others have been trumpeting the selfish gene, others have worked hard to show that cooperation in the biological world is not an afterthought but part and parcel of the dynamic of evolution (de Waal 1996; Sober and Wilson 1998; Margulis 2000). Any biological concept of cooperation and altruism will still fall significantly short of the Christian call for altruistic behavior, but the work of these scholars suggests that the story of cooperation and competition, altruism and selfishness, is quite different than the version often given by sociobiologists. The story of human history is not simply a story of selfish genes versus cooperative culture. Rather, cooperation and competition occur at many levels, producing both beauty and ugliness, good and evil. The implication of this research for Hefner's con-

ception of the created co-creator is potentially significant, for it suggests that Hefner's position on human nature is more accurate than that of the scientific sources he actually cites.

It Does Not Imply that We Are Either Wholly Free or Wholly Determined. A key feature of the created co-creator is the emphasis on human freedom. Central to Hefner's account is the dual inheritance of nature and culture, with nature often standing for what is determined in human life and culture standing for that which is free. Of course, such a dualism is inadequate, because there is some freedom (so to speak) in gene expression and much that is determinate (and determinative) in culture. As in much of his thinking on the created co-creator, Hefner avoids metaphysical arguments about freedom and determinism in favor of empirical considerations. Empirically, Hefner observes, we are in some sense both free and determined. On one hand, human beings are confronted with the necessity of making choices. Freedom in this sense is not an abstract quality but an unavoidable reality that we face every day. We are even, says Hefner, determined to be free. Human genes direct the development not of an organism that has only a fixed pattern of behavior but of one that must make decisions to survive. We are, somewhat paradoxically, free by nature.

On the other hand, Hefner argues, our freedom also is circumscribed by the selfsame genetic inheritance. We are by nature selfish, a fact that can be significantly (but not exclusively) attributed to our genetic and evolutionary heritage. In Hefner's view, this provides a means for reinterpreting the Christian doctrine of original sin along evolutionary lines as an awareness of the inner conflict within ourselves as symbiotic creatures of genes and culture.

Hefner views such an abstract question as whether we are metaphysically free as largely irrelevant to the reality of the human condition. It may or may not be the case that the experience of freedom can ultimately be correlated with a lower-level physical determinism. Such a fact, one way or the other, will fail to sufficiently inform us as to how we should act with the freedom we have.

Hefner's approach to metaphysical freedom and determinism is prudent, if ultimately unsatisfying to those who prefer a definitive statement on the issue. It is tempting to believe that the sciences, when reified into a philosophical naturalism, necessarily imply a metaphysical determinism. Such reification, however, precisely begs the question at hand, for it necessarily ignores the empirical (albeit unscientific in the narrow sense) experience of freedom that we are all aware of, sometimes painfully. Moreover, the sciences together suggest that any statement on human freedom and determinism in a metaphysical sense must, in the end, be highly nuanced, for even a deterministic account of human activity must allow for the amazing flexibility of human behavior.

It is important to note that much of the nuance comes from the cognitive sciences and that this has some impact for Hefner's empirical understanding of human freedom and determinism. The complexity of human behavior is matched by the complexity of the human brain, with its 100 billion neurons networked together in a way that still defies precise analysis. Much of our behavior and cognition may be said, in a sense, to be fixed or programmed, but much is also intensely sensitive to a range of developmental and environmental cues. More important, our brain alone does not tell the whole story, as it is connected to both our body and the environment, both of which provide constantly changing feedback.

In his account of human freedom, Hefner does note the role of the central nervous system, the complexity of the brain, and human biology. It would seem, however, that these factors are much more important for Hefner's empirical account of human freedom and determinism than he makes clear. In several places, Hefner emphasizes that human beings are a symbiosis of genes and culture. This dualistic dichotomy is very much part of the biological and especially sociobiological literature, but ultimately it is quite inadequate. As Ted Peters has observed, culture does not so much supply freedom as another form of determinism, so that human beings are bound by not one determinism (genes) but two (genes and culture) (Peters 1997).

A satisfactory account of human freedom must consider not only genes and culture but also the complex of brain/body/mind/person, for it is here that freedom ultimately emerges. In this vein, it is important to emphasize, as Hefner does, that we are determined to be free. That is, our biology is such that we necessarily develop into beings that cannot avoid making decisions. But note the character of freedom involved. Each brain/mind/person develops differently. At the level of the brain, genes seem to only broadly program the course of brain development, which is immensely affected by its environmental context. The developing brain is extremely plastic. Infants are born with far more neurons than they will use, and early child development is characterized not only by growth and development of neurons and neuronal connections but also by massive die-offs of those neurons that are not used by the brain/mind/person as he or she interacts with the environment (cf. Edelman 1992). Importantly, this interaction is not simply passive. Not only does the child experience the environment, the child also acts on the environment, so that the brain is, in a sense, self-formed.

Yet, the freedoms we have are of specific kinds. Hefner emphasizes the experience of genetic/evolutionary selfishness as a determined feature of our existence. But the kinds of freedom that we have and the constraints upon these freedoms are broader and subtler than Hefner points out. The developing science of emotion is but one instance of this sort of constraint. Work by Antonio Damasio and others points to the integrated character

of reason and emotion. There is an affective character to reasoning that, when impaired due to brain damage, results in severe mental dysfunction. Such individuals, it would seem, can reason but not make decisions (Damasio 1994, chap. 3). The appearance and regulation of these emotions, in turn, are dramatically affected by the presence or absence of neurotransmitters such as serotonin, the levels of which are partially affected by behavior and environment. Inasmuch as emotions are tied to issues of human freedom, well-being, and suffering, they become theologically relevant. Persons who suffer from depression do indeed suffer, and in a way that may have little or nothing to do with issues of selfishness. Such suffering, in turn, has complex antecedents and reveals both our freedom and lack of it. Individuals who suffer from depression may do so in part from personal choices (such as involvement in an unhappy relationship); depression, however, is also related to environmental and biological/genetic factors. In extreme cases, it can be seen as constraining and even destructive to freedom. Yet, individual action (determination to get help), environment (ending an unhappy relationship or seeking counseling), and even biology (altering serotonin levels through medication) can restore freedom in many cases.

While these considerations emphasize the personal character of freedom, they highlight the social aspects of freedom as well. This becomes increasingly clear as society develops increasingly sophisticated forms of biological and technological intervention on our own species. Increasingly, we will have the opportunity to decide which kinds of constraints that individuals must live with. Paradoxically, we are becoming increasingly free to determine our own character as well as that of succeeding generations.

It Does Not Imply a Biocentric Ethic. The theory of the created co-creator is as much (if not more) a statement of soteriology and the way things should be as it is a statement of metaphysics and the way things are. The created co-creator is, in Hefner's estimation, radically free, and this freedom is to be directed toward the love of neighbor and world. For Hefner, the development of altruistic love is the central task of the created co-creator, and the expression of that altruistic love is directed primarily toward our fellow human being. According to Hefner's central thesis (his "hard core"), the task of human beings (created co-creators) is to "birth the future that is most wholesome for the nature that has birthed us" (Hefner 1993, 264). Unlike many environmental theologies, Hefner's concept of nature includes and even emphasizes human communities where altruistic love can be experienced.

Does a theology of the created co-creator support an environmental ethic, and, if so, what kind? The answer to this question stands to tell us quite a bit about how Hefner conceives the created co-creator. Environmental theology of the past three decades generally has been critical of

anthropocentrism in theology and ethics and has argued for various forms of a biocentric ethic that acknowledges the intrinsic value of animals and nature as a whole (McDaniel 1989; McFague 1997), with the implication that animals and nature may be said to have certain rights that should not be infringed upon. A radical form of biocentrism would imply that there is, in fact, nothing special about humans and that it is only human presumption that places our rights above those of other creatures.

Hefner, too, is sometimes critical of the anthropocentrism of the Christian tradition, and he calls for a non-anthropocentric revision of the doctrine of the image of God (Hefner 1993, 239). At the same time, it is clear that, by virtue of being created co-creators, humans nevertheless play a special role within the created order. For Hefner, however, this is not to be taken merely as another form of anthropocentrism. Rather, it is to eliminate the thick border often placed between culture and nature. The presumption of many an environmental ethic is that the problem with the environment is human beings, and the solution is to get rid of any kind of human interference in order to, as much as possible, restore nature to its pristine state.

But, according to Hefner, humans are a part of nature. Citing Pierre Teilhard de Chardin, Hefner speaks of the hominization of nature and its evolution (Hefner 1993, 154). We ourselves, with all of our technological advancement and alteration of the environment, are a stage in the course of natural history. To value pristine nature over against human civilization is to misunderstand both nature and civilization. Nature is not static but dynamic, and we are now the most dynamic force of nature present.

On the surface, there could be no more glaring opposition than this, and it would seem that Hefner and many environmental theologies are strongly at odds with one another. At first glance, Hefner's created co-creator seems almost anti-environmental, and a jaundiced reading could perhaps easily side him with a naive technological optimism and even progressivism. This would be a mistake, however. Hefner does recognize in several places the scope of environmental destruction and our responsibility for it. The created co-creator is not anti-environmental but suggests a quite different route for thinking about our relationship with the natural world.

It is worth noting that no small part of this stems from the impact of evolutionary theory on Hefner's thought. For many involved in environmental philosophy and theology, the science of choice is ecology, for it reveals the intricate relationships between organisms as well as the effects of extinction and habitat destruction on whole ecosystems and ourselves. A tendency of environmental thought informed primarily by ecology is to think of nature in static terms and to emphasize its fragility in the face of radical change. As a result, environmental theologies tend to strongly contrast nature with civilization and to emphasize an ethic that imposes limits

on human activity. For Hefner, however, nature is dynamic and evolving. There can be no return to an original state, because nature is always changing. As a result, human change of nature may have negative consequences, but it is not intrinsically bad. Once again, we see the radical freedom Hefner attributes to the created co-creator. We do have the power to change the planet. Such change could be good, or it could be radically destructive. The choice is up to us.

Hefner's resolute refusal to see human beings as apart from nature may lead to some interesting possibilities. Because of the radical freedom of human beings, it might be said (somewhat poetically) that we *are* the freedom of nature, that especially in us nature acts. By virtue of our technology, we are also the technology of nature. At one point Hefner refers to human attempts at the manipulation and engineering of nature as the development of a technonature (Hefner 1993, 154). More recently, he has compared his concept of created co-creator to that of Donna Haraway's cyborg (Hefner 2001; Haraway 1991). A cyborg is a being composed of both nature and technology. Many of us can be said to be cyborgs in a small way, through the use of eyeglasses or contact lenses or by the surgical placement of artificial hip or knee. One might even say that we are cyborgs by nature, so intrinsic is technology to our everyday life. Through Hefner's concept of created co-creator, one might go a step further and say that nature becomes cyborg through human activity, that we are in the midst of the technologization of nature.

For many an environmentalist, such language sends a chill down the spine, for the immediate vision evoked is one of forests paved over, wild grasses replaced by monoculture crops, and genetic engineering run amok. Certainly, this is not Hefner's vision—recall that the created co-creator is to birth a wholesome future for nature. But the question is, What precisely is this wholesome future for nature? Hefner is largely silent here, where much could and needs to be said. The created co-creator, with its emphasis on dynamism, human freedom, and altruistic love, potentially has much to offer.

It Does Not Imply a Narrowly Denominational Interpretation. Hefner's Lutheran affiliations are well known, and to a certain degree Lutheran concerns and emphases are part and parcel of Hefner's elucidation of the created co-creator. Categories of original sin, and nature, and grace, for instance, play prominent roles in the development of his theology. Members of other Christian traditions may have difficulty with some of these categories. At the same time, it is worth noting that Hefner's theological program avoids the kind of dogmatization that could kill a genuine dialogue, not only among different religious traditions but also with the sciences. Much of this is due to Hefner's methodology. Christianity is understood in a real sense as a proposal, a view of reality that must be

tested alongside others. In *The Human Factor,* Hefner heuristically uses the philosophy of science of Imre Lakatos to elucidate the tentative character of the theological task, but he has consistently used the language of proposal elsewhere also (Hefner 2000). Terming Christianity as a proposal, however, does more than cast theology as a science. It also acknowledges the future-directed and soteriological character of theological reflection. A proposal is not simply thought about. It is acted upon. Because proposals are tentative, they are open to correction and revision. To term the created co-creator as a proposal is to understand the dynamic character of the idea employed.

In light of this, it is worth considering what significance the created co-creator might have not only for the existing range of Christian traditions but for genuine interreligious dialogue as well. Certainly, inasmuch as the concept of the image of God is shared with Muslims and Jews, the created co-creator might be a starting point for an interreligious dialogue that also involves science and technology. It is less clear, however, how the created co-creator might translate for Hindu and Buddhist communities. Would the created co-creator bring new insights into commonalities, or simply an awareness of existing differences? If the latter, might it provide a means for understanding how these differences can be overcome? These are as yet unanswered questions, but they are provocative ones. The great difficulty of science-religion dialogue is to recognize the sheer plurality, both on the side of science and on the side of religion. An approach that engages this full range of plurality is sorely needed. If the theology of the created co-creator could provide such a resource, it would be a significant accomplishment.

Concluding Considerations: the Created Co-Creator's Next Phase

Understanding what the created co-creator is not is part of the task of understanding what the created co-creator is. It also suggests further avenues for exploration and development of what is, indeed, a highly creative proposal. This is an important point, for the theology of the created co-creator is incomplete in some important ways.

In particular, three lines of thought seem especially important to pursue. First, who is the God of the created co-creator? As indicated above, Hefner has elucidated a number of lines of thought that contribute to answering this question, but a more systematic and thorough appraisal would provide significant underpinnings for understanding who and what the created co-creator is. The development of a robust doctrine of God that can face the challenges of both modernism and postmodernism remains a daunting task. To be co-creators implies that God is also creator, not only in the distant past but also in the ongoing present. This at least

potentially raises the question of divine action, which has been of central concern to many in the science-religion dialogue. In what sense does God create, and how does that creativity impact both humanity and creation as a whole?

A second line of thought involves the question of the relation of theology and the sciences and, in particular, in what sense theology must construe any scientific account of anthropology as necessarily incomplete. Hefner believes that any theological anthropology must take the biological sciences into account, but he also indicates that a theological anthropology goes beyond the biological sciences. In the current context of scientific and philosophical debates about human nature, this is a tremendously important claim that deserves to be developed, for it suggests a rather different understanding of the relationship between science and theology than is common. In particular, Hefner's emphasis on the soteriological element of anthropology is key. One might say that the sciences, by their very methodological strictures, must provide a limited anthropology. A full, genuine (theological) anthropology must necessarily take the soteriological risk, to which the sciences can only incompletely contribute.

A third line of thought relates to the second. What is the destiny of the created co-creator? How, in fact, is this radical freedom to be used, particularly in relation to the many complex issues now facing our species? What is needed is the development of an ethic of the created co-creator that addresses the basic questions of who we seek to be and what we seek to do. With regard to issues of the environment, the created co-creator may shed new light on how to approach existing issues. In an era in which we are faced by increasingly rapid developments in biotechnology, a new concern with the capacity for global terror, and the continuing transition to an information-centered, globalized economy, to come to grips with the destiny of the created co-creator will be an important task indeed. In this potential ethical component, Hefner's theology of the created co-creator differs in some significant respects from other, more abstract approaches in the science-theology dialogue.

Addressing these three issues—the doctrine of God, the relation of science and theology, and the potential for ethical impact—would go far in developing the theology of the created co-creator. It also would help to fill an important lacuna in the contemporary theology-science dialogue. While the question of theological anthropology in relation to the sciences has been addressed by a number of scholars, it has yet to be sufficiently addressed. The theology of the created co-creator is an important step in this direction and promises to set the agenda for many years to come.

Note

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CREATED CO-CREATOR IN THE PERSPECTIVE OF CHURCH AND ETHICS

by Roger A. Willer

Abstract. Philip Hefner's work on created co-creator is presented for consideration as a contemporary theological anthropology. Its reception within the Evangelical Lutheran Church in America falls into three main lines, which are reviewed here because they are suggestive of its potential impact on Christian thinking. This review raises two major questions and leads to a critique. The first question is whether *created co-creator* should be replaced by another term for the sake of more clearly encapsulating the ideas represented in Hefner's work. The second question concerns the moral "payoff" of created co-creator. Such questions lead to the critique that Hefner's corpus gives insufficient attention to responsibility as integral to freedom and that it lacks a theory of obligation. I then sketch the amenability and benefit of linking created co-creator with "responsibility ethics," exemplified by the work of Hans Jonas.

Keywords: anthropology; created co-creator; creation; ethics; Philip Hefner; Hans Jonas; nature; obligation; responsibility ethics.

Humans are nature. Humans are cultural. Humans are created in the image of God. These three interpretive statements cannot be considered sheer fact, yet neither are they sheer normative proposals that prescribe what a human being should be or do. For instance, one might agree that "Yes, humans are nature essentially, and this statement accurately represents what I perceive about human beings," or "No, I don't believe we are nature essentially because human essence is non-natural, it is an immaterial soul." Philip Hefner's attempt to meld all three statements into the statement that humans are "created co-creators" is such an interpretive one. It

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attempts to do justice to the human being as natural and cultural and as created in the image of God. As such, it is, inter alia, a proposal that Hefner offers for public consideration. By proposal I mean that we may understand him as offering to the theological and nontheological communities a hypothesis for understanding what human beings are. Like any hypothesis, it needs testing against the data of human experience and requires debate and refinement. The objective is that it might serve as an accurate description of human self-understanding.

The nature of created co-creator as an interpretive proposal is abundantly clear in several features of Hefner's work, although he may never have put the matter in quite this way. The first is the methodology specified in *The Human Factor*, described as operating in a "context of discovery" (Hefner 1993, xiii). The second is its unfolding development over the last twenty years from the introduction of the term in 1984, to full-blown theory in 1993, to an explication as metaphor in the late 1990s, to a more recent intention to designate it as a symbol. Its constitution as a proposal is also evident in the various formulations Hefner has explicated; he proposes, for example, that there is one variation of created co-creator for the philosophical "ambiance" and another for the Christian "ambiance" (1998, 181). Clearly he is attempting to offer the different publics of church, science, and academy a proposal suited to their own languages, a proposal that he believes sets forth an accurate interpretation of human self-understanding and gives special attention to incorporating the full measure of scientific knowledge.

We may legitimately ask, then: What has been the reception of this proposal by these various publics? I here probe that question particularly for the public called *church*. What do members of the church understand by created co-creator? How is it being used? How is it evaluated as an interpretation of human self-understanding? I carry out this task in my social location as a male pastor of the Evangelical Lutheran Church in America (ELCA), a staff member of the churchwide institution, and a graduate student in theology. I do not claim that my analysis satisfies rigorous social-science methodology, but I believe that my perspective is reasonably representative and informed, shaped as it is by participation in discussions about the created co-creator and by knowledge of documents and dialogue pertaining to it. The ELCA is not the only church audience to which created co-creator is addressed, but close attention to reception within that institution can be suggestive, I think, of the idea's reception in the wider church public. This attention to the church as a public is consistent with the theory of the created co-creator itself, since myth and ritual play such a central role in how it understands human development. It is appropriate to ask how created co-creator is being received by the public, which gives attention explicitly to myth, ritual, and symbol. Such attention to its reception can be a helpful occasion for both reflecting on the idea and con-

sidering what further explication is needed. Toward this latter end I also append, as a theological ethicist, some friendly amendments that I believe will enhance it as a concept and also point in the direction of work that needs to be done.[1]

The Created Co-Creator Concept in the Church

The evidence indicates that created co-creator generates interest and exercises influence within the ELCA. A church staff member commented (in an e-mail message referring to an op-ed piece about the unlikely political alliances between environmentalists and conservatives against biomedical cloning and alluding to a conversation from the previous day),

> It seems to me this phenomenon [the alliance against biomedical cloning] implies that the concerns we talked about yesterday during the review of the health care statement about the implications of Hefner's theological anthropology are not any longer, if they ever were, hypothetical, armchair theologians' issues. They are quite alive, now, and begging for a theological response. And that response is urgently needed for the church's public ministry regarding genetic issues.
>
> If the model of human as a co-creator with God is a viable theological anthropology, as Hefner proposes, then what needs to be addressed is where God is in human co-creating activity, and how God's action or will is to be discerned by human co-creators. It also cries out for some specification. What does it mean as a theological anthropology to say that human beings are co-creators? What limits or direction, or ethical guidelines or rules, if any, are to be applied to how this co-creating activity affects future human beings? And on what are those limits, directions, guidelines or rules based? In other words, what do we discern about God's intention for humanity that informs how we act as co-creators in human genetic endeavors? (Duty 2002)

Several points in this comment merit attention, but the relevant point at the moment is the sheer fact that created co-creator is a topic of conversation in the day-to-day interchange of the ELCA's institutional life. Such attention can be documented throughout all the sectors of the church's life. The sector designations I use, very simple ones, are (a) institutional, (b) academic, (c) Sunday morning (sermons, worship, and education), and (d) folk theology.[2] Created co-creator is making an impact in each of these sectors even to the point of being employed at the level of folk theology, the broadest of the groupings. It is easy to document references to it in the work of ELCA theologians, in ELCA documents, educational materials, and so forth. Ralph Klein, professor at the Lutheran School of Theology at Chicago, refers to the "pervasiveness of Hefner's influence in both the scientific and ecclesial communities . . . no expression has more characterized the theology of Hefner in recent years than the understanding of the human as a 'created co-creator'" (Klein 2001b, 164). My request to a few colleagues for reflections and documents related to this essay quickly generated a stack of informal and unpublished evidence as well. Created co-creator turned up in a Masters of Theological Study (MTS) project that

surveyed thirty-five ELCA members on their reactions to the concept (Welliever 2001). It also was used in a lecture to a congregational weekend forum titled "Ongoing Creation and Created Co-creators" that was twenty-eight pages long! Other reports mentioned discussions about created co-creator at board meetings, Lutheran ethicist gatherings, faith-and-science conferences, and so forth. Though a small sample, such evidence suggests that church members "out there" in all four sectors are debating, thinking about, and calling upon it. Created co-creator has made its way into the thinking of the church.

As a simple analytic device, I divide responses to the concept into three categories: (a) great idea! (b) bad idea! and (c) vital idea, but needs revision. The first category includes those who may want to clarify or expand certain of its points or accents but who offer no substantive critique and harbor no significant reservation toward the proposal. The second includes those who may find it thought-provoking, original, or even insightful but who finally reject the primary thrust as misdirected. The third category is a broad one that includes any who generally support the proposal but identify some substantive problem that needs attention. These problems range from Philip Clayton's charge that created co-creator finally fails in its worthy attempt to synthesize "the conceptual foundations for integrating naturalism and theism, hard science and the interpretative humanities, modern and postmodern categories, rationality and faith" (1995, 1) to a call for the necessity of replacing *created co-creator* with a different term like *co-creative creature*. A fundamental distinction slices through the membership of these heuristic categories and through the sectors mentioned previously, that is, the fundamental split between those who have read the "definitive documents" about created co-creator (*The Human Factor* and the essay "Biocultural Evolution and the Created Co-Creator" [Hefner 1993; 1998]) and those who have not.[3] The latter are necessarily reacting to created co-creator with, at most, a brief explanation of its meaning. It bears repeating that this distinction may be found in all three heuristic categories and all four sectors of the ELCA.

Great Idea. So how does the average layperson respond when he or she hears "created co-creator"? The good news is that a clear majority favors the notion of created co-creator. The bad news is that human procreative capacity—sexual reproduction—is the rationale most commonly justifying that affirmation! This highly unscientific and tongue-in-cheek observation is grounded in an analysis of thirty-five responses to the question "Do you agree or disagree that human beings are co-creators with God? Why or why not?" This question was asked as part of an MTS project (Welliever 2001) that investigated the operative theologies of creation among ELCA members in the state of Washington. It is not a scientific sample by any means, but conversations with dozens of others suggest

to me that we need not dismiss these answers as nonrepresentative of ELCA members across the church. I would go so far as to contend that they are representative of the kind of responses to created co-creator that one might expect in the folk-theology sector if one did a methodologically sound sampling. Several points relevant to our investigation are evident in their answers. These include the prevalence of the terms *responsibility, freedom,* and *creativity* as well as an acknowledgment of cooperation with and yet dependence on God and the understanding of creation as a making of things. Those who affirm the concept also tend to offer a positive assessment of human beings and their capacities.[4] Consistent with comments in this survey, it has been my experience that laypersons of all walks, but especially scientists and business people, tend to find the notion of created co-creator appealing as an affirmation of their interests and professional practices. This is exemplified by one scientist's comment at a church consultation: "This idea of created co-creators is like stew for the famished. I've been waiting to taste it for years, cook me up some more!"

Many scholars also express their support. Examples include Ted Peters, John Polkinghorne, Vítor Westhelle, and John Albright (Klein 2001a). However, the supportive voices are not all academic theologians. An agricultural economist says, "For most of my adult life, I have been concerned about the relationships among Christianity, academia, and the rest of society. Tonight I will attempt to tell you where I have come out under the title 'Ongoing Creation and Created Co-creators'" (Johnson 1998, 5). He goes on to say that not just scientists but all human beings belong in the category of created co-creators and points out that humans now supplement God's ongoing creative activity on earth. He obviously grasps key aspects of the term and credits that to attending lectures in the Zygon Center's "Epic of Creation" seminar. Even when stating reservations about his own limited understanding he shows how much he has grasped. He writes that humans are to be "regarded as created by God in the image of God and as part of nature. As such, man [sic] is conceived to reflect in nature (however incompletely) some of God's own character—complete freedom, intentionality (pursuit of purpose) and love. Let me note that I state this here in the fear that I may misunderstand Hefner and be oversimplifying his ideas to the point of doing more damage than good" (1998, 5).

Bad Idea. Those in the "Bad idea!" camp argue that the term advocates human hubris, places humanity on a level with the divine, or overestimates the human potential for creativity (Peters 1998, 33). In much less sophisticated form, these precise concerns are expressed in the MTS questionnaire by the fourteen who reacted negatively to the question "Do you agree or disagree that human beings are co-creators with God?" (Welliever 2001). Any resemblance of human activity to God's creative activity, limited though it may be, is rejected as suggesting a favorable comparison

with God. Two additional points jump out in their comments. The first is the passionately negative view of human beings held by some that reject the construct. Descriptive phrases include: "Humans are too destructive and too violent," "We are all disabled from the neck up," "As successive generations pass, our intelligence level drops," and so forth. Second, the most-repeated comment involves denying that humans can be considered co-creators in any way because humans cannot create out of nothing. It seems that *creation* here is equated with *creatio ex nihilo*, creation out of nothing. We might note, with some satisfaction, that this seems to indicate that ELCA folk theology holds a conscious appreciation of the Christian doctrine of *ex nihilo*. If so, it also means that any use of the term *creation* or *co-creator* must attend to that appreciation. While the average layperson has not read the definitive works on created co-creator, naturally, related concerns are still shared by some scholars who have. In his full-length review of *The Human Factor* noted scholar Langdon Gilkey—not an ELCA person—raises the red flag that created co-creator "could be viewed, in part, as a covert expression of nineteenth-century liberal beliefs in progress. In fact, human culture and freedom are more ambiguous products of both good and evil, and hence we must take more cognizance of the pervasiveness of what theology has termed sin" (Gilkey 1995, 293).

Other thinkers raise the objection that humans are stewards but not co-creators. These two terms, indeed, are used sometimes to sum up contending views about Christian anthropology (see Jersild 2000, 166, and the section on stewardship in Rollinson 1994). Rejection of created co-creator in favor of stewardship tends to follow from one of two positions. The first occurs among those who reject theological projects in principle that revise or reinterpret traditional Christian doctrines. Such views may not oppose rephrasing theology according to contemporary idiom, but any alteration to the historical content or any synthesis with modern knowledge is rejected out of hand. The second and more common position insists that the Christian understanding of humans as being in the image of God means that they cannot be co-creators, because they are simply stewards. This view often maintains close ties to the classical Western view of the human as the crown of creation in a hierarchy of being, "a little lower than the angels" (Psalm 8). It carries the stamp of tradition and has a default authority even though tied to a static worldview.[5] Those championing the stewardship model insist that humans are manipulators, not creators; servants, not co-partners, in the process of creation; and their concern is to emphasize the importance of structures and human limitations.

The difference between these two views is genuine and breaks through to the surface when probed. One instance of this occurred at an ELCA consultation on cloning in which created co-creator was discussed as a theological proposal for framing conversation about human cloning (Willer 2001, 84). Those who believed that new technological powers overstep—

in principle—human limitations rejected the construct because it deems cloning to be, in principle, a quintessential human act. Such designation of cloning as a quintessential act does not necessarily condone all cloning activity, but those who look to the time-honored notion of the steward or the manager as the model of Christian anthropology reject such principled openness.

Vital Idea, but Needs Revision. The affirmative and negative options lie alongside this third opinion. Here is affirmation of the intent of created co-creator but with significant reservations or concerns. This position is exemplified within the ELCA by theological ethicist Paul Jersild, who in his *Spirit Ethics* (2000, 167–70) affirms the testimony of created co-creator to the distinctively human capacity to give shape and form to the future. He agrees that this capacity is a matter of human destiny, yet he wants to maintain a stronger notion of structure and an emphasis on limitation that he believes is better represented by the idea of stewardship. He wants both.

We are hearing other reservations and suggested corrections in the present seminar. In that spirit I want to spotlight two sets of concerns that have been prevalent. The first centers on the term *created co-creator* and the second on the moral "payoff."

Is *Created Co-Creator* the Most Adequate Symbol?

Some question whether the theory of created co-creator might be better represented by a variation of the term. The question is not new; ethicist Franklin Sherman suggested the alternative "co-creative creatures" in the early 1990s (Simpson 2002), and Arthur Peacocke noted a preference for "co-creating creature" in his introduction to *The Human Factor* (Hefner 1993, xi). Hefner has maintained the importance of his terminology and the grammatical ordering of created co-creator, with *created* as the modifier and *co-creator* as the noun. To raise the problem here may seem like retreading old ground, but I contend that it has new urgency. I believe that a notable number of supportive individuals are troubled by the misunderstandings that *created co-creator* bears in its wake and are concerned about this for the sake of the construct itself as a successful proposal. One could say, using Hefner's classification, that they affirm the substance of created co-creator as a theory but find it problematic as metaphor or as symbol.

Those who employ created co-creator at the level of theory ought to have explored the details of the concept and should be expected to avoid the misunderstandings that we explore next. However, the same cannot be expected of those who use the term as metaphor or as symbol without knowing the theory. As a symbol, it will be used widely by many who have no awareness of its source and cannot be expected to attend to the nuances.

Because Hefner is concerned now to establish created co-creator as a symbol, this issue takes on heightened importance. This concern dovetails with the widely acknowledged need in the church for operative language that will permit the interface of faith and science. *Created co-creator* seems to be one contribution on its way to providing this for the church. For all of these reasons, it is the natural time to ask again whether this is the most adequate phrasing for the idea. In order to illustrate these concerns, I sketch some of the apparent problems by calling upon the sources we have already unearthed.

In common usage, *created* drops out. The reduction to *co-creator* is remarkably consistent within the ELCA materials examined—in every sector. In every case cited above, *co-creator* is repeatedly used alone, whether by Jersild as a scholar (2000, 168), or by the ELCA executive, or the thoughtful scientist, or in the MTS document. These individuals could be expected to know at least the basis of the created co-creator theory, but *co-creator* nonetheless receives the stress. Note the phrasing of the MTS question: "Do you agree or disagree that human beings are co-creators with God?" The list could be extended, and we can only surmise that it is and will continue to be so in popular usage, in sermons and educational conversation, and even, unfortunately, sometimes in scholarly work. In these cases, it is obviously not the conscious intent to co-partner humans with God on equal terms. Moreover, these instances are not cases in which we see overly optimistic assessments of the character of human beings. Why, then, does *created* drop off?

Perhaps it is simply linguistic. English emphasizes the noun as primary and the modifiers as secondary. Thus, it may not be surprising that the English speaker's eye goes to *co-creator*, that the tongue stresses it, and that *created* drops off in usage. Gary Simpson, theologian at Luther Seminary, builds on this fact in his observation that "the noun 'creator' seems to harbor the symbolic weight and power, and even with 'co-' prominently (and rightly) prefixed, the weight falls on 'creator.' As a symbol there's a lack of distinction with the Creator (uncreated)" (Simpson 2002). Thinking historically here, it is interesting that traditional Christian anthropology generally places the uniquely human character as a modifier, as in the "rational animal." Is there wisdom in this? Central to created co-creator, furthermore, is the insistence upon the continuity of the human being as nature, a continuity so thoroughgoing that no hint of metaphysical dualism remains. Here again the linguistic stress of the phrase necessarily falls away from the guardian of that point, that is, away from the *created*. In a culture fraught with a dualistic residue, a culture that wants to maintain a sheer distinction between the artificial and the natural, should not the emphasis on continuity register the most attention, not the least? In short, does the natural stress on *co-creator* function antithetically to several key themes of the idea?

These concerns seem strong enough to me that the question must be asked again whether the intent of created co-creator will be distorted so frequently by its phrasing that it cannot serve as the most adequate symbol. By calling upon Paul Tillich's discussion of the character of symbol (Tillich 1957, 41f.) we may express the kinds of considerations to be addressed. He delineates how symbols are distinguished by participation in "something beyond themselves" and that they open new levels of reality, levels that nonsymbolic language simply cannot designate. Is the "something beyond itself" to which created co-creator points misdirected by the phrasing *created co-creator*? Does that term most adequately designate the reality in which the symbol participates?

While it is true, as Tillich holds, that symbols cannot be produced intentionally, it is still the case that contenders can be assessed and ultimately chosen for their adequacy. So it is legitimate to ask: What is the strongest phrase that would most adequately convey and maintain the fullest intent of the created co-creator theory? In the alternative "co-creating creatures," for instance, does *creatures* as the noun strengthen the emphasis on human continuity with nature? Does it lift up more adequately the character of human life as dependent upon and as a gift of God? Would *co-creating* as the modifier more prominently promote the Creator/creature distinction without losing the salutary shock of naming humans as co-creative? An incontestable point is that this construction would never be shorn of one of its parts. Not even a casual comment would use *creatures* as a stand-alone description of human beings.

More could be said, and there are some evident drawbacks,[6] but the point here is simply to raise the questions. I am not advocating a specific alternative or even contending that an alternative would function more effectively. I am suggesting, however, that this irksome issue needs to be revisited in terms of the concerns just identified and because of the growing usage of the term in the church. At stake are legitimate questions about the effectiveness of created co-creator as metaphor and as symbol.

Created Co-Creator's Moral Payoff and Responsibility Ethics

The second set of concerns is devoted to what we might call the moral payoff of the idea. If created co-creator is a more or less accurate interpretation of the human being, what are the moral implications? We may recall the centrality of that question in the quotation from the churchwide executive, and it seems safe to state that moral payoff is a major concern among many who oppose the idea of created co-creator. Such concern is legitimate. Moral judgments in every instance are undergirded by a normative account that specifies what goods or values we ought to seek (i.e., an axiology) and, further, why we ought to seek them (a theory of obligation).

This normative hub of moral decision turns on the axis of fundamental beliefs about what is the character of the universe, including the question of what is the character of the human being. In short, the normative dimension of ethics—axiology and obligation—is linked to the fundamental dimension of ethics, the level at which created co-creator operates. Given the intimate connections between the normative dimension of ethics and a fundamental claim like this, it is quite legitimate to weigh its moral payoff.

Freedom is Not the Ultimate Value. This attention to moral payoff may also shed light upon a central confusion about created co-creator. Both advocates and detractors sometimes confuse the fundamental interpretive account—which it is—with a normative statement, which it is not. This misreading is evident in the materials I have presented. The confusion often centers on the central motif of human freedom. In this confusion created co-creator is read as normatively proposing that human freedom, creativity, and so forth ought to be dominant primary values, tempered a bit by wisdom, of course. This reading understands the concept as a normative proposal that might articulate its moral maxim as "Maximize the use of human freedom in all that you are and do." Some applaud this reading, while others object to it. To return to a previous illustration, recall the ELCA consultation on cloning. When created co-creator identifies cloning as a quintessential human act, many read this as a normative prescription advocating the use of all forms of cloning because this is warranted by human freedom. Some cheered this, and others objected to the term for this reason, but it factored clearly in the discussion that ensued. It is perhaps instructive that one of the written responses to Hefner's paper at the consultation—one sympathetic to the idea—emphasized the principle of caution as a necessary counterbalance to created co-creator (Crossman 2001, 32). The point is that the discussion and elaboration of the construct must stress that it is not a normative proposal but rather an interpretive one of fundamental theology and that any judgment about its merits must be made on whether it is an accurate reflection of the human situation or not. We must, for example, distinguish the affirmation of cloning as a quintessential human act from the additional moral decisions that are necessary about whether or not to proceed with human cloning, and under what conditions.

Such clarity, however, only leads us to the proper moral assessment. If created co-creator is in fact proposed as an accurate interpretation of the human situation, what then *are* the normative implications? What does the proposal that human beings are created co-creators imply about how we are to live and what we are to do? What axiology and what theory of obligation—to continue our attention to these two essential issues—does it imply or, at least, may we infer? Hefner has given some attention to these questions, but insufficiently I think, especially on two related issues.

I realize that in turning to such concerns I am shifting burdens. Up to this point I have been burdened as a churchman to analyze the reception of created co-creator. Here I shift to the task of theological ethicist whose task is to analyze conceptually in order to offer amendments to it. The link between tasks, though, is clear in that a major concern in the church's reception has to do with its moral implications. This effort to connect my two burdens may result in creating an essay as unwieldy as an overloaded trailer behind an already filled van, but I hope not. It does mean I will have to be exceedingly brief, if suggestive, in what follows.

I take as my focus several strategic passages from one of the definitive essays:

> We may summarize how the created co-creator theory interprets human existence in the following statement:
>
> *The concept of the created co-creator proposes that the purpose of human being and human culture is to be the agency for birthing the future of the nature that has birthed us—the nature which is not only our own genetic heritage, but also the entire human community and the evolutionary and ecological reality in which and to which we belong—at least the nature that constitutes planet earth.* In the final section of this essay, we will place this naturalistic statement of purpose within the ambiance of the Christian theological tradition in this form: *Homo sapiens is God's created co-creator, whose purpose is the "stretching/enabling" of the systems of nature so that they can participate in God's purposes in the mode of freedom, for which the paradigm is Jesus Christ, both in respect to his life and to his understanding of the world as God's creation.* (Hefner 1998, 181)

A careful reading of these two core statements makes clear that human freedom is not the primary value in the thought world of the created co-creator; rather, the elementary value is the furtherance of nature—that is, of the ecological nexus of earth which is inclusive of the human community but not confined to it. Freedom and transcendence are key "goods" in this, as is made clear a few pages later where Hefner summarizes created co-creator as the metaphor of the meaning of nature: *"The appearance of Homo sapiens as created co-creator signifies that nature's course is to participate in transcendence and freedom, and thereby nature enters into the condition in which it interprets its own essential nature and takes responsibility for acting in accord with that nature"* (1998, 183; emphasis in original). The fundamental value, though, remains the contribution to nature's unfolding (theologically spoken of as God's purposes unfolding in the enterprise we call creation). Nature has given testimony to what is in it—freedom and transcendence—by what it has allowed to come forth. The ultimate goal is to further that unfolding.

The Ethical Health of Created Co-creator. We have here, then, a clear axiology, but the subsequent question does not have a clear answer: What is the imperative to seek this value? Where, in this naturalistic statement, do we find the establishment of the absolute good to which an individual or the human community is bound in obligation? For example, why should

we care about the future of nature? In short, the theory of obligation appears absent. When Hefner transposes the created co-creator into his Christian key—what he calls "Christian ambiance"—an obligation appears in the Christian's response to the Christian God. There is, further, a paradigm upon which to build one's moral choices—"Jesus Christ, both in respect to his life and to his understanding of the world as God's creation" (see above). This may be instructive in the Christian theological framework, but it leaves an obvious and pernicious weakness in the development of the idea: insofar as created co-creator is a philosophical interpretation, it has an axiology without an obligation. If this is so, should we be surprised by the tendency to read *freedom* as the ultimate value?

This absence of obligation grounds the additional problem, in my view, that the work on created co-creator has given insufficient attention to the moral factor of responsibility. Hefner has given extensive attention to human freedom in his work but noticeably less attention to freedom's flip side, responsibility. In the summary statements above, freedom is highlighted several times, while responsibility is mentioned but once. The significance of responsibility can be inferred, but it is not spelled out. Such an imbalance extends throughout the body of work on the created co-creator. This may be understandable, since freedom is a widely debated theme in contemporary literature, but does not the theory of the created co-creator also cry out for careful attention to the nature of the responsibility that comes with the freedom it so carefully describes?

In summary, I have identified two related conditions troubling the ethical health of the created co-creator: (1) the lack of an evident imperative of obligation, at least in its naturalistic philosophical framework, and (2) the underdevelopment of responsibility. The proper prescription for this diagnosis, to my mind, is a hefty infusion of medicine from the contemporary sector of ethics known as "responsibility ethics," an approach generally understood as an alternative to virtue or deontological ethics. Let me briefly indicate why responsibility ethics is amenable to the created co-creator and how it would be salutary to these two conditions.

Responsibility Ethics. A wide array of thinkers, beginning in the twentieth century, may be classified as "responsibility ethicists," because in each case responsibility is the root metaphor or first principle of their ethics and the ethically decisive issue is upon what or who makes a rightful claim upon our lives. Diversity characterizes this stream of thought, as is immediately evident when we include in this camp the likes of Karl Barth, H. Richard Niebuhr, Hans Kung, and Paul Ricoeur. The centrality of responsibility is evident in each, and their ethics simply are not reducible to an ethics of virtue or duty (Schweiker 2001, 18). Some versions are not congruent with created co-creator, because the who or what that makes a claim upon the human does not include nature. Such incompatible versions of

responsibility ethics retain the modern commitment that morality is grounded within human consciousness alone. This is evident in Emanuel Levinas's sole attention to the infinitely other in another person (Levinas 1999), Karl Barth's divine command ethic (Barth 1957), and Marion Smiley's insistence that we jettison all ontological baggage and find the source of responsibility in social practices of praise and blame (Smiley 1992). Other versions of responsibility ethics, nevertheless, explicitly share the term's inclusion of nonhuman nature or at least are conducive to such. I call in particular on the work of Hans Jonas here, for reasons that will become evident.

Responsibility ethics as a whole emphasizes a view of the human being that we may call *agentic-relational.* Whereas virtue theory focuses on patterns of self formation and well-being in the human, according to the excellence (*virtu*) given by nature or in community, and Kantian-style ethics conceives of human beings (for normative purposes, at least) as solitary reason under the rubrics of duty, responsibility ethics pictures humans as dialogical creatures shaped by and existing within patterns of varied interactions (Schweiker 2001, 18). This emphasis spotlights the human as an agent, but one necessarily in continual formation through relationships. It should be immediately evident that the human being as interpreted by the idea of created co-creator is of this agentic-relational type as well.

Other convergences abound. The emphasis of created co-creator is that the context of human agency entails evolutionary continuity between the human species and the rest of nature. Hefner writes, for instance, "The fact that the created co-creator has appeared is a statement about what nature has come to, what nature is capable of, and what nature itself has produced or allowed to appear" (1998, 182). Although Jonas begins with an analysis of nature rather than an analysis of human being, note the parallel language when he refers to human self-consciousness: "Reality, or nature, is one and testifies to itself in what it allows to come forth from it. What reality is must therefore be gathered from its testimony" (Jonas 1984, 69).

We could delineate numerous points of convergence, but just one more—the place of freedom—should suffice to validate our claim. Hefner insists that any discussion of human freedom must acknowledge two facts often overlooked: (1) freedom is a corollary of determinism, and as such neither element may be abstracted from the other or from the human situation as if they enjoyed existence in and of themselves; and (2) both elements have arisen in conjunction with natural, physical, evolutionary processes. Jonas also insists on both points, though of course they are expressed in a different genre. In his essay "Evolution and Freedom" Jonas writes that freedom "must designate an objectively discernible modality of being, i.e., a manner of existing that typifies the organic realm per se and to that extent is common to all members (but to no nonmembers) of the class" (1996, 61).

Jonas's term for this modality of being is "needful freedom," a term that obviously incorporates Hefner's insistence on freedom's link with determinism and is best understood under the category of purpose. Human freedom, according to Jonas, is simply an instance of this purposiveness in nature (Schweiker 1995, 196). It is an immensely powerful instance, but the point is that human freedom does not magically appear out of sheer deterministic nature. It results from the linkage of self-conscious knowledge in the human being with the purposiveness evident throughout the biosphere. Human action requires choice, is more complex and open, and has immense power because of this linkage, but human beings share with the whole biosphere the common feature that every purpose entails an affirmation of being over nonbeing. Alternatively, as Hefner says, action "is marked in humans by conscious deliberation, decision, and taking of responsibility, and a certain autonomy" (1993, 113).

It should now be feasible to accept, at least tentatively, that responsibility ethics of this type holds natural affinities with the created co-creator. The fit is not flawless, of course, but is still quite potent.[7] What contribution, then, would responsibility ethics bring to the idea? The most obvious one is that it would rectify the insufficient attention to responsibility, especially in terms of the hallmarks of responsibility ethics: the relation of freedom and responsibility, moral identity, the centrality of power, and the need for its transvaluation in the symbol of God (Schweiker 1995, 50). In short, linkage with responsibility ethics would provide created co-creator with a clearer recognition that free creatures are inherently responsible creatures.

A Theory of Obligation. The linkage of the created co-creator with responsibility ethics also could provide the missing theory of obligation. The import should be obvious. We recur to Jonas's work, although we cannot do justice here to the sophistication of the theoretical work involved. As noted above, Jonas presents a meticulous argument for the existence of "needful freedom" within the biosphere. This claim flies in the face of most modern thought and entails a painstaking proof on his part of the existence of purpose, or ends, in all living things (Jonas 1984). The relevant point for a theory of obligation is that nature, by having aims, ends, or purposes (in this case each of these amounts to the same), also necessarily harbors and so grounds values. He points out that, with the existence of any particular purpose, its attainment becomes a good and frustration of it a loss. This fact grounds the attribution of value to all living organisms and means that nature is not value free. He admits that any particular purpose of a living being cannot be a good in itself (in this Hume and Kant are correct), but purposiveness as such *is* a good in itself (Hume and Kant overlook this possibility). Purposiveness, then, is an ontological characteristic of the biosphere, and the mere capacity to have

any purpose at all is a good in itself. Only humans can articulate this intuitive certainty, but the reality of purposiveness is characteristic of the biosphere. As Jonas puts it, "In every purpose, being declares itself for itself and against nothingness. Against this verdict of being there is no counterverdict, for even saying 'no' to being betrays an interest and a purpose. Hence, the mere fact that being is not indifferent toward itself makes its difference from nonbeing the basic value of all values, the first 'yes' in general" (1984, 81). If purposiveness is indeed something by itself, it belongs to the stock of being in general, is not dependent on an actuality of what happens to exist at a given time, and is not a sheer construct of the human mind. Axiology, then, becomes a part of ontology—contrary to modern presuppositions.

The value inherent in this basic value of being as such is therefore the maximization of purposiveness, that is, the growing wealth of goals striven for. To say it in a different way, the very presence of purposiveness in nature implies that being is better than nonbeing, and the value of its increase is a natural extension of this fact. The superiority of purposiveness over purposelessness thus provides an ontological axiom for its maximization. In this way Jonas can argue that all of nature clearly has inherent value because it is a location of purposiveness. Humanity matters deeply to nature's project as the maximal actualization of its potentiality for purposiveness —the maximal that we know of, at any rate—but purpose is not a sheer human construct. Here is the basis of obligation for a philosophical or naturalistic ethic, the problem identified above.

The natural question we must now ask is whether such an account meshes with Hefner's work. The answer must be brief but affirmative. It is well known that Jonas puts forth the argument that modern technology is an ontological event in the course of history, an argument we might enlarge, with Hefner, to "in the course of evolution." This ontological shift results from the unprecedented powers humans hold in splitting the atom, engineering genetics, impacting the entire biosphere, and so forth. These powers alter the very nature of humans as causal agents and bring unprecedented scope to human responsibility, that of responsibility for the future of nature; nature has become a human trust. The congruence here should be obvious with Hefner's statements quoted earlier (see p. 851).

An additional congruence is the fit of Jonas's "imperative of responsibility" (Jonas 1984) with Hefner's value of "stretching/enabling of the systems of nature" (Hefner 1998, 181). On the basis of the theoretical work we have just sketched, Jonas states the imperative of responsibility as: "Act so that the effects of your action are compatible with the permanence of genuine human life" (Jonas 1984, 11). He emphasizes, obviously, the danger to humankind, yet this is not anthropocentrism. The precondition that all of nature must flourish in order for genuine human life to flourish would be consistent with Jonas. Indeed, the place of Jonas' book *The Imperative*

of Responsibility as a shibboleth in the Green Movement (Wolin 2001, 108) is powerful evidence for this claim.

Just as Hefner identifies a paradigm for Christian obligation, Jonas identifies one for his imperative of responsibility. Jonas recognizes that knowledge of an imperative alone lacks the element of psychological motivation that is necessary to prompt action for the good. Such knowledge can remain entirely passive; only evidence of a feeling of responsibility that binds the actor to the object will prompt humans to act. Jonas identifies this in the face of a newborn, the face of the future. The newborn is the primordial paradigm of the coincidence of objective responsibility with the subjective feeling of the same (Jonas 1984, 130f.). Parental responsibility to the newborn is the paradigm in this theory of obligation.

Jonas's thought, then, could make several contributions to the idea of created co-creator. It could provide a theory of obligation, help specify what value lies in nature, instantiate the idea of human freedom as an instance of purposiveness, and offer criteria for guiding moral choices. His work would allow us to ask, for example, whether this or that choice seems to maximize the flourishing of purposiveness in nature. That is, does it encourage more manifold and intensive occasions of purpose, and so forth? (Jonas 1984, 81) In addition, Jonas's work contains a clear precautionary element that would benefit the concept. Jonas insists that the imperative of responsibility entails what we might call a *heuristics of precaution*.[8] In the hazards of taking action, precaution takes precedence, and the first moral duty is that of visualizing the long-range effect of a technological enterprise from general recognizable trends. Humans have an obligation to preclude those actions that cannot be demonstrated as safe for the future, that is, safe for the nature that has birthed us. The interweaving of these aspects of Jonas's work with the created co-creator would remedy weaknesses indicated in my analysis of the term including the charge that it advocates human hubris.

Conclusion

This effort to sketch the merit of interweaving responsibility ethics and created co-creator leaves the argument incomplete and has overlooked mutually critical issues that must be adjudicated. For instance, one may ask whether Jonas's philosophical work can be translated into a Christian framework. The prominent role Jonas serves in William Schweiker's *Responsibility and Christian Ethics* (1995) suggests a quick affirmation, but other questions, tensions, and incompatibilities would need attention. My goal here has been simply to demonstrate the need and potential for that work. If this has been accomplished, I have achieved the somewhat unwieldy linkage of my initial concerns—questions in the ELCA about created co-creator as a symbol and about its moral payoff—with the role that

responsibility ethics may play in the further exploration of the salutary proposal that humans are created co-creators.

NOTES

A version of this essay was delivered at the Chicago Advanced Seminar in Religion and Science, "The Created Co-Creator: Interpreting Science, Technology, and Theology," organized by the Zygon Center for Religion and Science, Spring 2002.

1. Additional caveats: First, this concentration on the church public does not assume that we may draw thick black lines between the church and other publics. For instance, I consider a paper given in the academy (at the American Academy of Religion) by an ELCA member legitimate data about "reception in the church." Rather, it assumes simply that it is legitimate to distinguish various publics, or audiences, whose interests, training, and social practices distinguish them from each other. Second, I recognize that my reflections are not based on methodologically rigorous research. The ELCA is not even a sociologist's sample of the visible church. The evidence I use is not designed to meet standards of statistical sampling; the documents, conversations, e-mails, and anecdotes are far too small a sample to claim scientific rigor or the standards of the intellectual historian. Despite these methodological inadequacies, I believe that the generalizations I make from the evidence are more informed than off-the-cuff reports and will prove in time to be indicative, and perhaps even representative, of how created co-creator is being received in the ELCA and beyond.

2. The term *folk theology* here parallels the notion of folk psychology as currently used in philosophy of mind and given broad currency by the work of Patricia and Paul Churchland (Churchland 1986; Churchland 1989). *Folk psychology* indicates the web of assumptions about intention, consciousness, will, and so forth that operate as a working theory of mind in everyday interaction. Likewise, folk theology can be considered the general or commonsense ideas about God, human beings, creation, and so on that form the layperson's everyday theological framework. One ultimate goal of formal theology, whether academic, confessional, or whatever, is to influence the structure and content of this folk theology and thereby influence the actions and perspectives motivated by those beliefs.

3. Hefner designated these as definitive in a private conversation in early 2001.

4. It would be interesting to search out terms and ideas significant in Hefner's elaboration of the created co-creator, such as self-definition and overcoming dualism, that are absent from these comments, but I leave that for another essay.

5. Clearly, stewardship arose in the tradition when nature was viewed as nonevolutionary and fixed and in which every species has a telos. Whether *steward* can really be de-linked from static notions without moving to created co-creator under some designation is a debated question that I do not explore here.

6. Two quick examples of its drawbacks: "co-creating creatures" does not have the same rhetorical ring, nor is it quite as shocking to the mind, as "created co-creator."

7. I do believe that my comments illustrate, in fact, how selective forms of responsibility ethics hold better affinities with created co-creator than virtue or deontological ethical thought, but that claim is beyond my point here. It should be clear, at least, why I believe responsibility ethics offers significant promise for the science-and-theology conversation.

8. Jonas uses the term "heuristics of fear" (1984, 26), because of the threat to the future of humanity. *Fear* suggests, however, an emotional reaction of alarm and agitation caused by the expectation of harm, while *precaution* suggests a more thoughtfully considered and proactive response to potential harm. My use of *precaution* rather than *fear* seems faithful to Jonas's concern, although the evocative character of the term *fear* is mitigated, and an emotional reaction may sometimes be warranted. *Fear*, nevertheless, in my judgement, remains problematic and too open to misunderstanding.

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FAUSTUS IS US

by Alan Nordstrom

for Nicholas Maxwell

Faustus personifies our lust to know,
That science which we seek so avidly,
Since knowing leads to doing as we grow
In power to control our destiny.

But Faustus sold his soul for what he learned,
His bargain with the Devil granting him
A period of supremacy unearned
By merit, making his moral vision dim.

And so it is with us, so powerful
In realms of science and technology,
Who know so much of how, much less of why
Or what is wise, who rather play the fool
Than seek to earn the true supremacy
Of knowing how to live, not how to die.

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Articles

THE OTHER SIDE OF SILENCE: RACHEL CARSON'S VIEWS OF ANIMALS

by Marc Bekoff and Jan Nystrom

Abstract. The publication of Rachel Carson's *Silent Spring*, a compelling blend of stories, natural history, human values, and biological facts, in 1962 was instrumental in launching the modern environmental movement. We consider Carson's attitude toward animals in *Silent Spring* and in her other writings. Carson favored responsible stewardship and was more of an animal welfarist and environmentalist/conservation biologist who privileged ecosystems and species than an animal activist who privileged individuals, and she did not advocate an animal-rights agenda. There is clear tension in Carson's writings. Often she seems troubled by attempting to come across as a moderate and practical scientist, and some of her words, when considered out of context, could lead one to label her as an animal-rightist. While some of Carson's writing favors human-centered interests, she did not believe that only humans counted. Her warnings about silent springs must be taken seriously, perhaps even more seriously than when they were penned more than four decades ago. Carson was a passionate and extremely influential activist and if a world of persons like her were in charge of our global environmental policies, we and our fellow animals would be in much better shape than we currently are.

Keywords: *And No Birds Sing*; animal rights; animal welfare; Rachel Carson; conservation biology; DDD; DDT; environmentalism; *Lost Woods*; pesticides; *Silent Spring*.

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Rachel Carson and Animals: An Overview

The publication of Rachel Carson's *Silent Spring* in 1962 is widely regarded as one of the major events that launched the modern environmental movement. *Silent Spring* is a compelling blend of stories, natural history, human values, and biological facts. It is about more than just the cumulative and devastating biological effects of pesticides ("biocides" or "elixirs of death" [1962, 8, 15]) that result in environments devoid of melodious birdsong. It is about life itself, focusing on the many different webs of nature that go unnoticed, misunderstood, and unappreciated until we lose them. *Silent Spring* catalyzed grass-roots movements, sparked a presidential investigation, raised awareness among the general public about the effects of pesticides, and resulted in the banning of DDT in the United States and the development of tests for pesticides.

Carson was a courageous activist with a practical bent. She exhorted us to reconsider the choices we make concerning our fundamental relationship to nature, an alliance that should be teeming with appreciation, awe, humility, connection, harmony, and reverence rather than with dismissal, arrogance, control, distance, discord, and irreverence. Education is critical. Carson not only issued a wakeup call for us to do something about how we destroy and desecrate nature but also demanded that we wake up our senses and our sensitivity—that we keep our senses alive.

In this essay we consider Carson's attitude toward animals in *Silent Spring* and in other texts. Despite the facts that she was raised to love nature and animals, wrote beautiful, passionate, empathic, and sometimes anthropomorphic prose about animals, used anecdotes to celebrate the lives, beauty, and fates of individual animals, species, and ecosystems, spoke out about the use of such contraptions as live traps, and penned a strong and impassioned preface to a book about the appalling abuse and torture of animals in slaughterhouses in the United Kingdom, very little direct attention has been given to Carson's views about our moral responsibilities to, and the moral standing of, animals. Many of the animal issues with which Carson was troubled are in the forefront of present-day concerns. Carson used animals as indicators of environmental destruction and the well-being of ecosystems, and she deeply lamented their pains and suffering at the hands of humans. The absence or silence of animals is intolerable—and a warning that something is very wrong. Their silence indicates that an ecosystem has been poisoned. And what befalls the animals befalls us as well.

Some of the specific questions with which we are concerned either directly or indirectly are: What were Rachel Carson's attitudes toward animals? Was she an animal activist? Was Carson an animal welfarist or an animal rightist? Did she "hold back" her more radical views about animals for fear of alienating the general public and so undermine her goal of alerting us to the dangers of pesticides? Might she have been more open about

her feelings about animals if she did not have another agenda? Was she conflicted about the way animals were used by humans for human ends? Did she have occasional human-centered leanings in her overall ethic of making the world a better place for all beings? Can her views about people having a "right" to enjoy animals and nature be reconciled with how she viewed the "rights" of people who hunt and fish? What would socially responsible science look like to Carson? Did she consider a hands-off policy as an alternative strategy for some of the issues with which she was concerned? Is *Silent Spring*, clearly a call to action and a personal vision, also a book of hope? Needless to say, many of these questions cannot readily be answered yes or no.

We cannot deal in great detail with all of these or other questions that arise, but we think that it is appropriate and instructive to look closely at *Silent Spring* to try to understand Carson's views on animals and animal well-being. We begin by discussing different positions on animal protection (animal welfare and animal rights) that inform decisions about animal use and policy and then review some issues with which animal protectionists, environmentalists, and conservation biologists are concerned. Next we consider a number of ways in which humans intrude on the lives of animals at different levels of organization ranging from ecosystems to species to populations to individuals. Human beings are an invasive species. We intrude intentionally and unintentionally on ecosystems and animals wherever and whenever we choose. But we really are part of the story, part of nature's complicated and magnificent webs. Carson's primary concern was not with intentional human infringements but with how we live, how the chemicals we were using were degrading the environment and poisoning animals. Human infringements also include translocating—introducing and reintroducing—animals from one ecosystem to another (often referred to as "redecorating" nature [see Bekoff 2000a] or "faking" nature [see Elliot 1997]), trapping them, and using them for food and in education, in research, and for amusement and entertainment. Carson wrote about some of these types of intrusions.

We then attempt to determine Carson's position on animal protection by closely analyzing *Silent Spring* and some of her other writings. Her lyrical and passionate language celebrates the lives of individual animals, but she also often defers to the "rights" of people, from birdwatchers to hunters, to justify why we should protect ecosystems and thus the animals who live there, rather than deferring to the rights of the animals themselves. Her perspective ranges from reductionism to holism and from that of a moderate animal welfarist to that of a more extreme animal rightist, and she also freely commingles facts and values. She supported reverence for all life, an attitude similar to that espoused by Albert Schweitzer, a man she clearly admired, decried the slaughterhouses in the United Kingdom, and advocated for animals, yet often she described animals and ecosystems

not in terms of their intrinsic value but in terms of their value to humans. In some instances it is difficult to say just where Carson falls in the animal-protection arena. However, if we let her own words speak for themselves, we may determine if and how Carson attempted to resolve the conflicting views in her prose.

Animal Welfare and Animal Rights: A Brief Overview

In order to locate Carson's views on animals we first review the general differences between animal welfare and animal rights. Many animals suffer and feel pain (for general discussion see Bekoff 2000a, b; 2002), and because of this we should be careful not to cause them unnecessary pain and suffering. While some people believe that it is all right to cause animals pain and suffering if humans benefit, others believe that human benefits do not justify this. Some argue that it is all right to trade off individual animals for the good of their species, even if some individuals suffer and die. Most environmentalists and conservation biologists adopt this stance (Bekoff and Jamieson 1996; Bekoff 2001; see also Estes 1998).

Persons who believe that humans are allowed to cause animals pain but must be careful not to cause them excessive or unnecessary pain argue that, if we consider the animals' welfare or well-being, that is all we need to do. These persons are typically called *welfarists*. Welfarists are concerned with the quality of animals' lives. But welfarists do not believe that animals' lives are valuable in and of themselves, that it is just because animals are alive that their lives are important. Welfarists believe that if animals experience comfort, appear happy, experience some of life's pleasures, and are free from prolonged or intense pain, fear, hunger, and other unpleasant states, we are fulfilling our obligations to them. If individuals show normal growth and reproduction and are free from disease, injury, malnutrition, and other types of suffering, they are doing well. The welfarists' position also assumes that it is all right to use animals to meet human ends as long as certain safeguards are used. They believe that the use of animals in experiments and the slaughtering of animals for human consumption are permissible as long as these activities are conducted in a humane way. Welfarists do not want animals to suffer from any unnecessary pain, but they sometimes disagree among themselves about what pain is necessary and what humane care really amounts to. But welfarists agree that the pain and death animals experience is sometimes justified because of the benefits that humans derive.

Persons who believe that it is wrong to cause animals any pain and suffering and that animals should not be eaten, held captive in zoos, or used in painful research or in most or any research, are typically called *rightists*. They believe that animals have moral and legal rights that include the right not to be harmed and that animals' lives are valuable in and of them-

selves; their lives are not valuable because of what they can do for humans (their instrumental value) or because they look or behave like us. According to Gary Francione (2000), to say that an animal has a "right" to have an interest protected means that the animal has a claim, or entitlement, to have that interest protected even if it would benefit humans to do otherwise. Humans have an obligation to honor that claim for other voiceless animals just as they do for young children and the mentally disabled. So, if a grebe has a right to live in her native habitat, we have an obligation not to destroy or poison her home. (For general discussion of the differences between animal welfare and animal rights see Regan 1983; Singer 1990; Francione 2000, and for discussion of how different views are related to conservation biology see Estes 1998; Bekoff and Jamieson 1996; Bekoff 2000b; 2001; 2002.)

Environmentalists and conservationists usually are more concerned with populations, species, and ecosystems than with individuals. But some conservation biologists are troubled when making decisions about the relative value of individuals versus species, populations, and ecosystems. Clearly, so was Carson. Conservation biologist Jim Estes, discussing whether or not to rehabilitate oiled wildlife, specifically California sea otters, poignantly and succinctly gets to the heart of the matter:

> The differing views between those who value the welfare of individuals and those who value the welfare of populations should be a real concern to conservation biology because they are taking people with an ostensibly common goal in different directions. Can these views be reconciled for the common good of nature? I'm not sure, although I believe the populationists have it wrong in trying to convince the individualists to see the errors of their ways. The challenge is not so much for individualists to build a program that is compatible with conservation—to date they haven't had to—but for conservationists to somehow build a program that embraces the goals and values of individualists because the majority of our society has such a deep emotional attachment to the welfare of individual animals. . . . As much as many populationists may be offended by this argument, it is surely an issue that must be dealt with if we are to build an effective conservation program. (Estes 1998, 1157)

We can position Carson's views on animals (and the tension embodied in her text) by visiting the ongoing debate between animal rightists and environmentalists and conservation biologists. Rightists favor rights for or privileging individual animals, and environmentalists and conservation biologists typically favor rights for or privileging larger entities such as populations, species, or ecosystems. (It might be permissible for an individual to suffer or to die for the good of its species, though pain and suffering should be avoided whenever possible.) Carson is more of a practical welfarist, a stance usually adopted by environmentalists and conservation biologists, than an animal rightist. She chronicles much about webs of nature and webs of death and the importance of preserving nature's integrity, its goodness and wholeness, in all terrestrial and aquatic ecosystems.

Carson favored responsible stewardship. She privileged ecosystems and species over individuals and surely did not advocate an animal-rights agenda, although some of her words taken in isolation and out of context could lead one to the opposite conclusion. Although in her prose Carson often celebrates the lives of individual animals and describes them in very lyrical terms, her larger concern seems to be with healthy ecosystems and with how those ecosystems affect humans. Carson supported sport fishing and, in *Silent Spring,* noted that hunters' rights were being infringed upon when ecosystems were destroyed, but she also anguished over the sport killing of some sharks. She favored the introduction of nonnative shrews to Newfoundland as an alternative to the use of pesticides. Clearly, some of her text favors human-centered interests, but she did not believe that *only* humans counted.

Although we think that Carson should be considered more of an animal welfarist than a supporter of animal rights, we stress that this does not in any way lessen her significant impact on bettering the health of ecosystems and the well-being of numerous animals or her calling attention to the horrific effects of pesticides and "big science" contaminated by people—scientists on the take—with vested interests in the pesticide industry. If a world of Rachel Carsons were in charge of our global environmental policies, we and our fellow animals would surely be in much better shape than we currently are.

Redecorating and Silencing Nature: Human Intrusions into Animals' Lives

Before analyzing Carson's view of animals further, let us review briefly some of the issues with which animal protectionists are concerned and also some of the positions that they hold concerning the use of animals by humans. We offer representative examples to make general and specific points that relate to Carson's concerns about the effect of pesticides.

Human influences, also called anthropogenic effects, are rampant. We are here, there, and everywhere. Our just being out in nature, not even handling animals, can influence their behavior (Bekoff and Jamieson 1996; Bekoff 2001; 2002; Goodall and Bekoff 2002). Humans make a difference—directly and indirectly, intentionally and unintentionally—in the lives of just about all terrestrial, aquatic, and arboreal animals. We are a powerful and dominating force and an integral part of innumerable webs of nature. Along with our ubiquitous presence come deep responsibilities to step lightly into the lives of other animals. In his novel *Prey*, Michael Crichton writes of "the obstinate egotism that is a hallmark of human interaction with the environment" (2002, xii).

Not only do we influence the lives of other animals in an immediate sense, we also can effect long-lasting changes in their behavior (Bekoff in

press). Global warming is influencing the distribution and behavior of animals and resources such as food, water, and resting spots. It has been predicted that between 15 percent and 37 percent of species could go extinct between now and 2050 as a result of global warming. Trophy hunting is reducing the average size of horns among male bighorn sheep as large rams with big horns are selectively picked off. Selective hunting influences mating behavior such that there is less head butting among males for access to females during mating, and there might even be an influence on population genetics among these mountain monarchs. The feeding habits of bears who live around dumpsters change rapidly; they become active during the night rather than during the day to avoid humans, and these bears become obese and lazy. Fast food makes them fat. They also enter dens later in the fall and remain in them for shorter periods of time than do bears who do not forage at dumps. Hormones from cattle feed lots can demasculinize males and defeminize wild fish. Fishing can induce sex changes in fish. Animals such as cougars, coyotes, foxes, and deer often become so habituated to humans that rather than flee from us they become bold and curious and intrude into our neighborhoods. Often researchers inadvertently harm the very animals they want to study. Knowledge of how we affect the behavior of animals can help us make more informed and intelligent choices about how we interfere in their lives. There also is ample evidence that pesticides and other forms of environmental pollution affect the behavior of many animals (DellOmo 2002; Burger in press).

Carson was very concerned about humans' attempts "to mold Nature to our satisfaction" (1962, 245), to "redecorate Nature" (Bekoff 2000a; 2003). Animals are nonconsenting participants in these encounters and may also be, as Carson sympathetically notes, "incidental victims" (1962, 85). Carson was raised to love nature, and as a youngster she wrote stories about her experiences exploring her surrounds. Her philosophy about animals and other nature was clearly informed by these early experiences. In her own words,

> From what I have told you, you will know that a large part of my life has been concerned with some of the beauties and mysteries of the earth about us, and with even greater mysteries of the life that inhabits it. No one can dwell long among such subjects without thinking rather deep thoughts, without asking himself searching and often unanswerable questions, and without achieving a certain philosophy. (Lear 1997, 159)

Later we will return to what Carson might have thought about the havoc, pain, suffering, and death that we cause for innumerable innocent animals every second of every day.

Humans silence animals when we intrude into their lives and tamper with who they are and their habitats. Often, melodious birdsong and a wide variety of soothing and raucous sounds are extinguished. In addition

to the loss of sounds, we suffer when we lose the force of other sensory experiences—symphonies of visual images and odors—which celebrate the presence of other animals. Silent springs served as a clear warning that something bad was happening to the habitats in which birds lived, and we should indeed fear that silent springs may be followed by silent summers, falls, and winters if we do not change our ways and change them rapidly—today, not tomorrow.

When humans interact with nature we frequently wind up redecorating it, selfishly. Intentionally or not, humans seem to have a powerful inborn urge to reshape or recreate nature, to expand our horizons with few if any boundaries. We move animals around as we move furniture, and we redecorate landscapes with little concern for maintaining biological integrity. It seems that we cannot stop ourselves, and little else does—even the often horrific results of our trying to dominate, manage, and control our surroundings. Even during strolls in pristine forests, swims in oceans, or forays in the sky, many humans are detached and alienated from the majesty of their surroundings.

Human intrusions occur on different spatial and temporal scales and on various levels. We influence individuals, populations, species, and ecosystems. In addition, there are interactions among the different levels. Removing one individual from a group of animals influences not only that group but also the behavior of other groups of animals. As Carson and many others have noted, there are intricate and interconnected webs of nature, and these webs are very fragile.

Webs of Nature. Much of *Silent Spring* and Carson's other writings are concerned with the ways in which human activities disrupt the close interconnections of members of the earth community (see also Lear 1997; Cafaro 2002). She presents case after case of humans intruding on, destroying, and silencing ecosystems and intimately interconnected webs of nature.

The opening parable of *Silent Spring* portrays a healthy ecosystem as one in which humans and all other animals live in harmony, yet while Carson laments the loss of animal lives, her inclusion of animals often is cast largely in the value they bring to humans—birdwatchers and those who enjoy fishing or hunting. It is instructive to consider Carson's attitude toward animals, because it highlights many of the complex issues and also focuses attention on current debates and points of conflict between animals protectionists, environmentalists, and conservation biologists. Carson was concerned with our attempts "to mold Nature to our satisfaction" (1962, 245). The words she chose may reflect one way in which Carson attempted to resolve tension in her views about humans' proper relationship to nature. Some of Carson's most moving and empathic prose refers to webs of nature and their disruption and devastation. She displays

deep empathy, writing of "chains of devastation" when she refers to the death of robins as a result of a program to spray elm trees with pesticides, "one of the multitudinous spray programs that cover our lands with poisons" (1962, 109). About ninety species of birds, predators, and ground, treetop, and bark feeders suffered heavy mortality in this program.

Carson emphasized that we are all interconnected. When she wrote about the effect of arsenic in water pollution and the widespread occurrence of cancer she noted, "Here again we are reminded that in Nature nothing exists alone" (1962, 51). When she wrote about soil she stressed that the soil community "consists of a web of interwoven lives, each in some way related to the others—the living creatures depending on the soil, but the soil in turn a vital element of the earth only so long as this community within it flourishes" (p. 56). She also wrote, "For each of us, as for the robin in Michigan or the salmon in the Miramichi, this is a problem of ecology, of interrelationships, of interdependence" (p. 189). When she wrote about inshore waters she noted, "The inshore waters—the bays, the sounds, the river estuaries, the tidal marshes—form an ecological unit of utmost importance. They are linked so intimately and indispensably with the lives of many fishes, mollusks, and crustaceans that were they no longer habitable these seafoods would disappear from our tables" (p. 149). This last quote stresses not only the interconnectedness of all things but also human interests and raises the question of whether Carson would have been concerned with the absence of these animals as more than culinary delights. We believe she would have.

Persons who are interested in animals and conservation are keenly interested in webs of nature. Not surprisingly, the absence of close and reciprocal links among members of a community, however subtle, is the exception rather than the rule. Joel Berger and his colleagues (2003) note that while the notion of top-down regulation of communities by carnivores in terrestrial ecosystems has been controversial, their analyses lend support to top-down regulation in the Jackson Hole area of the Greater Yellowstone ecosystem. In Yellowstone Park there is evidence of an inverse relationship between wolf densities and elk abundance along with associated increases in the height of aspen suckers as elk densities decline (see also Smith 2003).

Disrupting the complex webs of nature can lead to silence, the loss of birdsong. Kevin Crooks and Michael Soulé (1999) discovered complex interrelationships among coyotes, other predators (called mesopredators) such as domestic cats, opossum, and raccoons, and scrub birds including California quail, wren tits, spotted towhees, Bewick's wrens, California thrashers, greater roadrunners, cactus wrens, and California gnatcatchers living near San Diego, California. Their research is an example of the importance of long-term projects that investigate complex webs of nature that are not obvious at first glance. Crooks and Soulé found that scrub bird diversity, the number of different species present, was higher in areas

where coyotes lived. Domestic cats, opossum, and raccoons avoid coyotes by shunning areas where coyotes are most active, and birds benefit. The disappearance of a dominant carnivore, the coyote, resulted in elevated numbers and activity of mesopredators who exert strong predation pressure on native prey species. Crooks and Soulé also discovered that the level of bird predation by mesopredators appeared to be unsustainable. Extinctions of scrub-breeding birds are frequent and rapid: at least 75 local extinctions may have occurred in their study areas over just the past century.

Redecorating and Managing Ecosystems. Moving animals from one place to another, or translocating them, is very often used to help endangered or imperiled species. Often animals are *re*introduced to ecosystems. About 65 percent of translocation projects involve reintroducing species to areas where they once lived (Tear et al. 1993) in which their numbers have dwindled or in which they have been exterminated—for example, reintroducing gray wolves to Yellowstone National Park (Smith 2003) and Canadian lynx to Southwestern Colorado (Bekoff 2001). Animals are also sometimes introduced to areas where they are not native. Carson does not write much at all about translocation projects, but she notes in her discussion of natural solutions to insect infestations that nonnative masked shrews were introduced in 1958 to Newfoundland to prey on problematic sawflies (Carson 1962, 296), and she favored this strategy. Although translocation was not a major concern of Carson's, she advocated the introduction of shrews as an alternative to chemical pesticide. Probably she had not thought through the ramifications of introducing a nonnative species: by 1962 shrews had spread over the island. Surely there are ethical issues that need to be addressed, for the introduction of nonnative species is a form of "control of Nature" (Carson 1962, 297) and can greatly influence webs of interactions and the integrity of an ecosystem.

Carson and Individual Animals

"I had to think myself into the role of an animal that lives in the sea. To bring this about I had to forget a lot of human conceptions. For example, time measured by the clock means nothing to a shorebird. His measure of time is not an hour, but the rise and fall of the tides—exposing his food supply or covering it again" (Carson 1998, 56). Carson was concerned with and celebrated individual lives as well as species and ecosystems. When she observed other animals, she tried to imagine what it was like to be them: "I was successively a sandpiper, a crab, a mackerel, an eel, and half a dozen other animals" (1998, 56). She decried factory farms in the United Kingdom, was incensed by cruel predator control programs and the federal government's wanton poisoning of wildlife, and became a member of the board of Defenders of Wildlife a short while before she died (Brooks 1972).

As an example of her sensitivity to an individual animal, consider a letter Carson wrote to her friends Dorothy and Stanley Freeman (Carson 1998, 169–70). On a midnight hike with her niece and grandnephew, she saw a firefly flying low over the water and at risk of getting caught by a wave. At first, Carson was puzzled by this strange behavior, but then she thought she realized what was going on: "he was flying so low over the water that his light cast a long surface reflection, like a little headlight. Then the truth dawned on me. He 'thought' the flashes in the water were other fireflies, signaling to him in the age-old manner of fireflies!" (p. 170) The firefly wound up mired in wet sand. Carson goes on: "You can guess the rest: I waded in and rescued him . . . and put him in Roger's bucket to dry his wing" (p. 170). This passage is significant because Carson refers to a firefly as an individual (a "he") rather than an object (an "it"). She attributes cognitive abilities to the firefly, noting that he "thought," although she qualifies this statement by putting the word in quotation marks. Finally, and perhaps most important, Carson considers it worthwhile to save the life of this firefly.

Carson describes play by herrings in this freely anthropomorphic and sensitive way: "Then the herring would begin flipping into the air. It seemed it was always out of the corner of your eye that you saw them, and you never quite knew where to look for the next little herring skipping recklessly into the air in a sort of back somersault. They did it as though it were great fun—this rash defying of a strange and hostile element, the air. I believe it was a sort of play indulged in by these young children of the herring" (1998, 37). She also writes of the parental care of swifts: "Swifts are devoted parents. The male and female take turns incubating the eggs during the nearly three weeks required for the young to hatch. Thereafter, both birds assume the chore of keeping the infant mouths filled with insects, a task that must be performed faithfully for about four weeks before the young swifts are able to take to the sky in their own behalf" (1998, 27). Carson also refers to old fish as "patriarchs of the river" (1962, 146).

Carson's observations of animals are reminiscent of the observational methods of such ethologists as Konrad Lorenz and Niko Tinbergen, and her identification with individual animals reminds us of the question that guides many students of behavior, What is it like to be this or that individual? When many ethologists observe other animals they try to become that individual—"I am coyote," or "I am raven"—in order to come to a fuller understanding of what it is like to be that creature (Bekoff 2002). This necessitates both an imaginative grasp of and an empathetic connection with the lives of other animals.

Animals as Food. Carson was very concerned about the use of animals as food for humans. She was not a vegetarian (Lear 2003b). In her preface to Ruth Harrison's book *Animal Machines*, about factory farming in the United Kingdom, Carson wrote,

Gone are the pastoral scenes in which animals wandered through green fields or flocks of chickens scratching contentedly for their food. In their place are factorylike buildings in which animals live out their wretched existences without ever feeling the earth beneath their feet, without knowing sunlight, or experiencing the simple pleasures of grazing for natural food—indeed, so confined or so intolerably crowded that movement of any kind is scarcely possible. (1998, 194)

The strong language in this passage is reminiscent of that of animal rightists. She also wrote,

I am glad to see Mrs. Harrison raise the question of how far man has a moral right to go in his domination of other life. Has he the right, as in these examples, to reduce life to a bare existence that is scarcely life at all? Has he the further right to terminate these wretched lives by means that are wantonly cruel? My own answer is an unqualified no. . . . Man will never be at peace with his own kind until he has recognized the Schweitzerian ethic that embraces decent consideration for all living creatures—a true reverence for life. (1998, 196)

Would raising animals for human consumption be permissible under any conditions? we may ask. What about methods that are not wantonly cruel?

Carson was a pragmatist in her view of animals. Linda Lear notes that

Carson quietly aided the work of [Christine] Stevens and the Animal Welfare Institute, writing to members of Congress in support of legislation banning the use of certain leg traps and against the inhumane treatment of laboratory animals. But she had to be careful not to draw too much attention to her support for causes that might link her in the public mind with fringe groups and extremists, lest she jeopardize her all-important work concerning the misuse of pesticides. Had this not been a real political consideration, Carson undoubtedly would have been an outspoken advocate of the humane treatment of animals. (Carson 1998, 192–93)

Lear clarified this point later:

The point I was making on p. 193 has to do with the chronology of Carson's life. She, cleverly, in my view, agreed to write that hard hitting forward to *Animal Machines* for a British book which she was fairly confident would not be widely read or known in the U.S. press. So she felt free to speak out. She wrote this in 1962, late, for publication in 1963. But at home the furor over SS [*Silent Spring*] was raging and her enemies were looking for ways to discredit her science and that meant looking for ways to call her a "kook." Being a radical animal rightist, or radical organic foods advocate meant being a communist, and certainly being far worse than the "bird and bunny lover" they had dubbed her. Such causes were ones she deeply believed in but were "peripheral" in 1963 to being heard and having her scientific evidence against the misuse of pesticides and its possible links to cancer be heard. If you put this statement in context to the fact that she was attacking corporate America and the agricultural economic breadbasket, you can see her point. (Lear 2003a)

Carson recognized the power of the consumer in bringing about change, an argument put forth by animal protectionists. Public outcries about the way in which veal calves are raised resulted in a drastic decline in the consumption of veal. To this end, Carson wrote: "I hope it [*Animal Machines*]

will spark a consumers' revolt of such proportions that this vast new agricultural industry will be forced to mend its ways" (1998, 196).

But what about the possibility of closing the industry down? Why not accept that factory farming cannot be humane for the individuals involved? Individuals suffer not only when they are mistreated but also when they hear, smell, and see other individuals being harmed and killed.

Indeed, today factory farming remains a huge environmental and animal-rights issue. Worldwide, more than 25 billion animals are killed each year in the meat industry, about 3 million each hour. Chickens are debeaked, pigs have their tails chopped off and their teeth pulled with pliers, and bulls and pigs are castrated. In the United States alone, more than 8 billion animals are killed annually for food. In both 2000 and 2001 a record high of 46 billion pounds of red meat was produced (beef, veal, pork, lamb, and mutton). Huge amounts of grain, forage, and land are used in food production. Animals consume more protein than they produce. For every kilogram (2.2 pounds) of animal protein produced, animals consume about six kilograms (more than thirteen pounds). One kilogram of beef requires about 100,000 liters of water, whereas one kilogram of wheat requires about 900 liters of water. The meat industry in the U.S. causes more water pollution than all other industries combined. An average pig farm generates raw waste equal to that of a city of twelve thousand people.

There is a connection between meat consumption and the use of pesticides. Pesticide advocates note that pesticides increase crop yield and thus have an important role to play in addressing world hunger. However, many of the crops produced are fed to livestock, which is an inefficient use of resources. The number of persons whose food energy needs can be met by the food produced by 2.5 acres of land is one person if the land is producing beef and two persons if the land is producing chickens, but fifteen if it is producing wheat and nineteen if it is producing rice (Weil 2003). If Americans reduced beef consumption by 10 percent, we would save 12 million tons of grain, the amount needed annually to feed every person who dies of hunger or hunger-related illness. If we decreased meat consumption, we would not need to resort to pesticides to increase crop yield.

Animals in Education and Research. Millions upon millions of animals are used in all levels of education and research worldwide (Bekoff 2002). Carson wrote briefly about such use of animals. She even sent a message to a congressional committee urging federal standards for the protection of animals used in research (Brooks 1972, 317). But, as in some of her prose about the use of animals for food, Carson took a moderate stance. In her essay "To Understand Biology" Carson wrote,

> To the extent that it is ever necessary to put certain questions to Nature by placing unnatural restraints upon living creatures or by subjecting them to unnatural conditions or to changes in their bodily structure, this is a task for the mature scientist. It is essential that the beginning student should first become acquainted with the

true meaning of his subject through observing the lives of creatures in their true relation to each other and to their environment. . . . To begin by asking him to observe artificial conditions is to create in his mind distorted conceptions and to thwart the development of his natural emotional response to the mysteries of the life stream of which he is a part. Only as a child's awareness and reverence for the wholeness of life are developed can his humanity to his own kind reach its full development. (1998, 193–94)

A number of questions can be asked about Carson's stated position. For example, is it "ever necessary to put certain questions to Nature by placing unnatural restraints upon living creatures or by subjecting them to unnatural conditions or to changes in their bodily structure" even for the mature scientist? What would Carson think about biomedical research? Is it ever necessary? It appears that Carson's position would sanction some biomedical research if it helped humans.

Alternatives

"Under the philosophy that now seems to guide our destinies, nothing must get in the way of the man with the spray gun" (Carson 1962, 85). "We must make wider use of alternative methods that are now known, and we must devote our ingenuity and resources to developing others" (1962, 138). Carson was surely concerned about animal well-being, but she comes across as a moderate welfarist. She did not seriously consider taking a hands-off stance in most instances (she did posit some natural alternatives to the control of pests) and often came down on the side of humans despite prose that would suggest otherwise. To be fair, she argued that both nonhuman and human losses were important, and she lamented the loss of natural landscapes and ecosystems by the introduction of chemical pesticides and various sorts of control programs. About the devastating effects of pesticide spraying she wrote,

> I know well a stretch of road where Nature's own landscaping has provided a border of alder, viburnum, sweet fern, and juniper with seasonally changing accents of bright flowers, or fruits hanging in jeweled clusters in the fall. But the sprayers took over and the miles along that road became something to be traversed quickly, a sight to be endured with one's mind closed to thoughts of the sterile and hideous world we are letting our technicians make. But here and there authority had somehow faltered and by an unaccountable oversight there were oases of beauty in the midst of austere and regimented control—oases that made the desecration of the greater part of the road the more unbearable. . . . In such places my spirit lifted to the sight of the drifts of white clover or the clouds of purple vetch with here and there the flaming cup of a wood lily. (1962, 71)

Carson proposed some natural alternatives to the use of pesticides. She urged people to pay more attention to the role of plant-eating insects (1962, 83), noted that imported parasitic insects had been used to establish natural control of pests (1962, 96), stressed the use of natural parasites in keeping budworms under control (1962, 138), and noted that around the year

1800 Erasmus Darwin suggested that insects may be controlled by using their enemies. As mentioned above, Carson also favored the introduction of nonnative shrews to Newfoundland to prey on sawflies.

Locating Rachel Carson: Textual Tensions and Responsible Stewardship

> I am saying, rather, that the control must be geared to realities, not to mythical situations, and that the methods employed must be such that they do not destroy us along with the insects. (Carson 1962, 9)

> Much of Carson's reputation rests on her ability to place the meanings of scientific ecology within an ideology of species preservation. In her beautiful descriptions of the daily round of animal communities, she stressed the importance of each species to the survival of the whole. Such knowledge demanded respect for all life and, Carson hoped, more restraint in dealing with animal populations. Her angry outburst against hunting sprang in part from her concern for the potential extinction of valuable species, but it also evoked the pain caused to a single animal. This interest in the rights of individual animals as well as endangered species formed a critical part of Carson's message. . . . [Carson] felt little contradiction between protection of species and human treatment of individual animals; these were complementary goals equally necessary to a holistic ethic of human-animal relations. Nor was there a hierarchy of concern for domestic over wild animals. (Norwood 1993, 161)

Carson was a prolific writer and openly and passionately shared her views with a wide audience. Lear notes that Carson believed that nature writers had a "moral obligation to bring the wonders of the natural world to the general public and urged them to accept that responsibility" (see Carson 1998, 93). In Carson's own words, "My own guiding purpose was to portray the subject of my sea profile with fidelity and understanding. All else was secondary. I did not stop to consider whether I was doing it scientifically or poetically; I was writing as the subject demanded" (1998, 91). Paul Brooks wrote of Carson's prose that "the merged imagination and insight of a creative writer with a scientist's passion for fact—goes far to explain the blend of beauty and authority that was to make her books unique" (2000, xv). Lear comments that "Rachel Carson's use of poetic language does not take away from the accuracy of her claim that her guiding purpose was to portray her subject with fidelity and understanding, without consideration of whether she was doing it scientifically or poetically. Accuracy and beauty were never antithetical qualities in her writing" (1997, 219).

As already mentioned, Rachel Carson's attitude toward animal protection is that adopted by most mainstream environmentalists and conservation biologists: by living in harmony with nature, human beings benefit not only themselves but all animals. Her writing reflects the ongoing debate between animal rightists, environmentalists, and conservation biologists, and she can be placed squarely in the environmentalist's and conservation biologist's camp. (For general discussion see Hargrove 1992;

Zimmerman et al. 1993; Jamieson 1998.) This is best exemplified in Carson's opening story, in which she pictures a man living in harmony with nature and his fellow creatures: his crops flourish, his life is graced by birdsong, and in the evenings the deer come out to play and the fox can be heard yipping in the distance. Within this scene, the man claims dominion. The world of this story is far from wilderness; it is a farm in which the man, as steward, has selected which crops to plant and has largely defined the landscape. Given his dominion, Carson argues that human beings should be responsible, compassionate stewards. (For further discussion of the notion of stewardship from theological and secular perspectives, see Wunderlich 2004.)

Carson's attitude, however, does not answer or consider some of the ethical considerations posed by animal rightists and welfarists. Although importing shrews and fostering colonies of ants are far preferable methods for dealing with noxious insects than spraying DDT, there are still ethical questions that need to be addressed. Is it acceptable for man to "play God" by introducing nonnative species, as in the case of the shrew? If so, why? Why is it acceptable for the "mature scientist" (Carson's words) to do some animal experiments, but not for the student? Do hunters and fishers have a right to pursue their games, and does their right provide justification for maintaining healthy ecosystems? Can we morally justify the value of healthy bird populations by invoking not the intrinsic value of bird life but the right of birders to enjoy bird watching? Does human dominion over nature through technological superiority necessitate that we attempt to control nature or "restore" ecosystems? When, if ever, should we leave nature alone? (Carson does argue for natural seashores [1991].) Does an individual animal's life have value, or is it only species that have value? Is it morally acceptable to eat animals as long as the animals are treated humanely and killed painlessly?

Although these questions are not explicitly articulated by Carson, such issues nonetheless inform *Silent Spring* and some of her other works. Carson's most lyrical, evocative prose celebrates the beauty of individual animals, yet the basic argument put forth in *Silent Spring* has human-centered leanings that wax and wane in many of her writings. The rights of human beings are being infringed upon when chemicals are sprayed on the environment; humans have the right to hunt, to enjoy nature's beauty, to go bird watching, and to live free of insecticides, which inevitably affect not only animals but humans. Within this paradigm, what are the rights of animals? Do they have any intrinsic value or intrinsic rights?

To pose these questions is not to criticize Carson. Surely a world like that of Carson's opening scene would benefit humans and our fellow creatures. Carson ultimately advocates a form of welfarism perhaps best characterized as "responsible stewardship." The ethical dilemmas regarding animals' role in the world of humans are among the same issues faced

today. All of these issues raise questions about what the proper role of humans is in relationship to nature—tyrant, responsible steward, or fellow creature? And, perhaps more important, what *should* our role be?

While Carson spoke out loudly and clearly for responsible stewardship by typically adopting a moderate, realistic, practical, and frequently human-centered and welfarist stance on the issues at hand, it is plausible that she might have suffered from some dissonance between the beautiful words she spoke and wrote and what she truly felt in her heart and wanted to happen. Lear agrees that Carson was a practical utilitarian and "was so bottled up but so powerful" (Lear 2003a). Carson's connections with Christine Stevens and the Animal Welfare Institute (she was presented with the Schweitzer Medal of the Animal Welfare Institute), her indebtedness to Albert Schweitzer and his philosophy of reverence for all life, her stand against the use of steel leghold traps, and her preface to *Animal Machines* all suggest that she held more radical beliefs than she publicly aired. Her use of fables about idealized and healthy ecosystems that define our proper relationship to nature and other animals reflects a deep commitment to making the world a better place for all beings. Craig Waddell argues (2000, 9) that "A Fable for Tomorrow," the opening chapter of *Silent Spring,* is an "apocalyptic vision." Lear claims that this fable was "a scary hoax, pure science fiction," and that many reviewers were "unable to understand its basis in allegory and used it to further demean her credibility as a scientist" (1997, 430). Lear also notes that Carson was passionate about animals but kept her views relatively private. She did not want to have critics use her advocacy for animals "to belittle her science" (1997, 371). In addition to her not being taken seriously because she was not a professional scientist, Carson also was accused of having communist sympathies (Waddell 2000, 157) and of being an overly sensitive and sentimental woman. Her critics were by and large members of a male-dominated technological society. She also relied on anecdotes, which, for most scientists, do not constitute hard evidence (although the plural of *anecdote* is *data* [Bekoff 2002]).

Carson was careful to put forth a moderate agenda about animal exploitation. In *Silent Spring* she wrote, "By acquiescing in an act that can cause such suffering to a living creature, who among us is not diminished as a human being?" (1962, 100). Hunting and fishing, two activities that Carson seemed to support (in *Silent Spring* and other texts, she referred to the "rights" of hunters) surely cause pain and suffering. Would she have argued that a humane death is permissible? She also accepted hunting, when kept in balance, as a valid use of government land, including on wildlife refuges, but she lamented the killing of individual sharks (Gartner 1983).

It is common for there to be a disconnect between what people say and feel and what they do. Some people who might rescue animals from shelters or pick up stray dogs and cats and who claim to love animals also wear leather and eat meat from slaughterhouses and factory farms.

There is tension in a number of areas of Carson's writing, including what we should do, what we should believe, who we should believe, what the rights of nature are, and what the rights of humans are to enjoy nature *and* to hunt and fish. Consider the following quotations from *Silent Spring* about our proper relationship to nature and to our fellow animals:

> But what of the opposite end of the food chain—the human being who, in probable ignorance of all this sequence of events, has rigged his fishing tackle, caught a string of fish from the waters of Clear Lake, and taken them home to fry for his supper? What could a heavy dose of DDD, or perhaps repeated doses, do to him? (1962, 49)

> Such poisoning of waters set aside for conservation purposes could have consequences felt by every western duck hunter and by everyone to whom the sight and sound of drifting ribbons of waterfowl across an evening sky are precious. (p. 45)

> To the bird watcher, the suburbanite who derives joy from birds in his garden, the hunter, the fisherman or the explorer of wild regions, anything that destroys the wildlife of an area for even a single year has deprived him of pleasure to which he has a legitimate right. (p. 86)

> This is a problem that concerns a great many people. Some 25 million Americans look to fishing as a major source of recreation and another 15 million are at least casual anglers. These people spend three billion dollars annually for licenses, tackle, boats, camping equipment, gasoline, and lodgings. Anything that deprives them of their sport will also reach out and affect a number of economic interests. (p. 139)

> The fisheries of fresh and salt water are a resource of great importance, involving the interests and the welfare of a very large number of people. That they are now seriously threatened by the chemicals entering our waters can no longer be doubted. (p. 152)

Carson refers to the interests of people in having healthy ecosystems in which to hunt and recreate as "rights." She does not address the "rights" of the animals who live in these areas.

Clearly Carson favors human-centered interests, but there seems to be some ambivalence about this attitude. For example, although she did not condemn sport fishing, Carson was very upset when she considered the killing of a shark for sport. She wrote, "Then one sees the slender shapes of sharks moving in to the kill. There was something very beautiful about those sharks to me—and when some of the men got out rifles and killed them for 'sport' it really hurt me" (1998, 154).

What Can We Do? Who Should We Believe?

Carson, as an activist, was extremely concerned with what people could do about the dire situation surrounding the use of pesticides and also about scientists and government officials with competing interests who were working for pesticide companies. Clearly there were conflicts of interest. Carson wrote harsh words about scientists "on the take":

This situation also explains the otherwise mystifying fact that certain outstanding entomologists are among the leading advocates of chemical control. Inquiry into the background of some of these men reveals their entire research program is supported by the chemical industry. (1962, 259)

The credibility of the witness is of first importance. The professional wildlife biologist on the scene is certainly best qualified to discover and interpret wildlife loss. The entomologist, whose specialty is insects, is not so qualified by training, and is not psychologically disposed to look for undesirable side effects of his control program. Yet it is the control men in state and federal governments—and of course the chemical manufacturers—who steadfastly deny the facts reported by the biologists and declare they see little evidence of harm to wildlife. (1962, 87)

Who has decided—who has the *right* to decide—for the countless legions of people who were not consulted that the supreme value is a world without insects, even though it be also a sterile world ungraced by the curving wing of a bird in flight? The decision is that of the authoritarian temporarily entrusted with power; he has made it during a moment of inattention by millions to whom beauty and the ordered world of Nature still have a meaning that is deep and imperative. (1962, 127)

Concerning the last quotation, we also can ask what about nonconsenting animals, individuals who do not have the ability or the right to decide their fate when the rights of animals and people are in conflict?

Carson also wanted to put forth a positive message to children. However, it was difficult at the time to be especially hopeful.

It is hard to explain to the children that the birds have been killed off, when they have learned in school that a Federal law protects the birds from killing or capture. "Will they ever come back" they ask, and I do not have the answer. The elms are still dying, and so are the birds. *Is* there anything being done? *Can* anything be done? Can *I* do anything? (1962, 103)

Silent Spring, Hope, and Humility

"Have we fallen into a mesmerized state that makes us accept as inevitable that which is inferior or detrimental, as though having lost the will or the vision to demand that which is good?" (Carson 1962, 12)

Rachel Carson was an extraordinary, passionate woman, and *Silent Spring* is an extraordinary, passionate book. But is it a book of hope? Yes and no. Carson surely is a hero, but heroes are not always hopeful. Nonetheless, we tend to want to make heroes positive. *Silent Spring* is dedicated to Albert Schweitzer and includes the following three quotations, none of which is especially hopeful:

Man has lost the capacity to foresee and to forestall. He will end by destroying the earth. —Albert Schweitzer

The sedge is wither'd from the lake, And no birds sing. —John Keats

I am pessimistic about the race because it is too ingenious for its own good. Our approach to Nature is to beat it into submission. We would stand a better chance

of survival if we accommodated ourselves to this planet and viewed it appreciatively instead of skeptically and dictatorially. —E. B. White

Clearly, Carson was and remains an incredibly influential woman. Why is this so? Carson was an activist with a heart who opposed many practices in which humans interact with other animals, encounters that animals usually lose. She warned us not to take for granted or squander nature's melodies. After all, it was her and others' concerns about the loss of animals' voices that prompted her to write *Silent Spring* as a call to action for what was being done to the environment by the indiscriminate and irresponsible use of pesticides. But wasn't her concern about pesticides finally a concern about us? If we poison the natural world, animals may die first, but we will follow. Carson herself was dying of cancer.

Carson also mandated that we must abandon our attitude of controlling nature. She concluded *Silent Spring* as follows:

> The "control of Nature" is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that Nature exists for the convenience of man. The concepts and practices of applied entomology for the most part date from that Stone Age of science. It is our alarming misfortune that so primitive a science has armed itself with the most modern and terrible weapons, and that in turning them against the insects it has also turned them against the earth. (1962, 297)

Note that she does not go on to write anything like "but there *is* hope if we do something about it." She did attempt to do much about the harm we were causing to Earth, devoting much of her short life to making the world a better place for all beings. The very act of writing books, of tirelessly and selflessly reaching out so as to raise consciousness and to call people to action, are acts of hope. Why write a book or travel about and expose oneself to personal insult and criticism if all is lost?

The issues with which Carson was concerned are difficult, challenging, frustrating, complicated, and strongly personal. Many remain with us today: scientists on the take (Cornwell 2003; Krimsky 2003a, b), pesticide companies taking their time to clean up their messes (Pearce 2003), the protection of pesticide manufacturers (Eisler 2003), increased use of pesticides worldwide (Huff 1998; Wood 1997), behavioral changes in animals due to pesticides (DellOmo 2002; Lee 2003; Burger in press), and the negative effects of pesticides on reproduction in humans (Izakson 2004) and animals (Lee 2003). There also is evidence that immigrant workers suffer greatly from exposure to pesticides and that their only options are "shutting up or getting out" (Clarren 2003, 7).

Carson's final essay in *Lost Woods* (1998) eloquently captures her views, which are laden with humility. In a letter to her friend Dorothy Freeman, Carson reflected on the life cycle of the monarch butterfly. Her reflections on death as part of the natural cycle of life bring together many themes: humans' relationship to something larger, the beauty of nature, the beauty

of animals, and the need for humility and connection. So, it is important to stress that although there are human-centered leanings in Carson's work—she does trump animal interests with human interests in areas where stronger and more zealous animal advocates would not—who among us does not occasionally share and implement these sentiments? It is indisputable that Carson deeply loved nature and animals. Perhaps the tensions she experienced reflect those shared by many of us as we try to live ethically and step lightly with grace, care, compassion, humility, beneficence, and love in a very complicated, challenging, and daunting world.

The Other Side of Silence: Where Have All the Animals Gone?

> One means of sanity is to retain a hold on the natural world, to remain, insofar as we can, good animals. (Stegner 1960)

> The image of the world around us that science provides is highly deficient. It supplies a lot of factual information, and puts all our experience in magnificently coherent order, but it keeps terribly silent about everything close to our hearts, everything that really counts. (Max Schrödinger, as quoted in Revel and Ricard 1998, 214)

These words of Wallace Stegner and Max Schrödinger nicely capture much of what Carson stood for. We need to be "good" animals and respect other animal beings and a very fragile Earth; we need to step lightly and with care because we are so omnipresent and destructive. Carson's warnings about silent springs—silent seasons—must be taken seriously, perhaps even more seriously than when they were penned more than four decades ago. Surely, on the other side of silence await magic, awe, and nature's cacophony of sounds, along with a panoply of other deep, radiant, and vibrant sensory experiences that help us to feel at one with all of nature. We must be careful never to allow nature to be silenced.

Every individual is part of a communion of subjects (Berry 1999), a vital member of innumerable webs of nature. Along these lines, recall Carson's words about how interdependent and interconnected we all are: "Here again we are reminded that in nature nothing exists alone" (1962, 51). And: "The inshore waters—the bays, the sounds, the river estuaries, the tidal marshes—form an ecological unit of utmost importance. They are linked so intimately and indispensably with the lives of many fishes, mollusks, and crustaceans that were they no longer habitable these seafoods would disappear from our tables" (p. 149). Carson also stressed that "The predator and the preyed upon exist not alone, but as part of a vast web of life, all of which needs to be taken into account" (p. 257).

We are all in this journey together. Each of us is an integral part of the ongoing story of life and of the panoply of nature's magnificent and wondrous webs. What befalls animals befalls us. Carson's request that we

reconsider our fundamental relationship with nature, that we undergo an internal revolution, is consistent with the message of ecopsychologists who note that we ourselves feel better when we treat nature with kindness, respect, and compassion. A close relationship with nature is critical to our own well-being and spiritual growth.

Silent springs, along with silent summers, falls, and winters, brought about by silencing animals, are not good for us or for other animals. We owe animals our utmost unwavering respect and concern for their well-being, independent of our own. We all need to be careful lest individuals in a future generation one day wake up and ask, "Where have all the animals gone?"

Note

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ENVIRONMENTAL ETHICS AND COSMOLOGY: A BUDDHIST PERSPECTIVE

by Brian Edward Brown

Abstract. The ground for a Buddhist environmental ethic is rooted in one of the earliest formulations of Buddhist teaching, the principle of dependent co-origination. This concept provides an ecological perspective where nothing exists in and of itself but only as a context of relations, a nexus of factors whose peculiar concatenation alone determines the origin, perpetuation, or cessation of that thing. The primacy of dependent co-origination is consistent with the subsequent development of Mahayana Buddhism and its concept of Tathata (wondrous Being), as understood through the complementary doctrines of the Tathagatagarbha (embryonic consciousness) and the Alayavijnana (Absolute Consciousness). Together, these specify the ontological and epistemological framework for understanding wondrous Being as the movement toward its own self-revelation: it comes to recognize itself as the essential nature of all things in and through the human mind, which is grounded on and informed by it. Through such a cosmology, coherent with the classical ideals of a bodhisattva, Buddhism reinvigorates the human in an ethic of mindful awareness of, reflection upon, and care for life in its entirety, as the species that can identify the integrity of the whole in the richness of its diverse particularities.

Keywords: Alayavijnana (Absolute Consciousness); bodhisattva (enlightened being); Buddha nature; Cittaprakrti (innately pure mind); cosmology; dependent co-origination; Dharmakaya (Cosmic Body of the Buddha); dukha (suffering, unhappiness); Hinayana; independent self-subsistence; Mahayana; self-emergent reality; sentient beings; sunyata (emptiness, nonsubstantiality); Tathagatagarbha (embryonic consciousness); Tathata (wondrous Being, Suchness); Vijnanavada (consciousness-only school).

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We gather here to celebrate the fiftieth annual Star Island Conference sponsored by the Institute on Religion in an Age of Science. Specifically, we convene to address the phenomenon of ecomorality, exploring the thesis advocated by the international Earth Charter that "the protection of the Earth's vitality, diversity, and beauty is a sacred trust."

It is noteworthy that we engage this issue in a year that marks another anniversary directly related to the substance of the theme we are exploring. In 1973 the United States Congress passed the Endangered Species Act, landmark legislation that for the first time accorded rare plants and animals and their habitats protection against extinction. Yet this thirtieth anniversary of its passage has gone largely unheralded. Rather than hailed as an established public consensus for the extension of legal rights to the natural world and the consequent human responsibilities and obligations for its care and integrity, the Act remains tenuous and exposed to political threats that would eviscerate the fundamental protections it has thus far accorded to threatened fauna and flora. Sensitivity to the moral value and legal significance of the nonhuman communities of living beings that interdependently define the planetary coherence that is the biosphere are all too often marginalized by the idiom of an economic exigency that confines value to the immediate satisfaction of human want. Accordingly, commitments to biodiversity, natural habitats, and the preservation of planetary air, waters, and soil frequently are sacrificed to a conception of the natural world as mere resources for consumption and exploitation.

If the significant ecomoral values already articulated and initiated by the Endangered Species Act are to survive and advance beyond the depredations of the reified orientation that would otherwise relegate its anniversary to a silent dismissal, concerted efforts are needed to identify a cosmology that will enhance and maximize the integrity of the whole earth community. It must be a cosmology capable of sustaining the ethical principles of the Act and other domestic and international expressions of the need for protection for the earth that transcend the narrow confines of human self-interest. Such practical measures for the enhancement of life for the innumerable communities of nonhuman beings will prove resilient and persistent to the degree that they are grounded in an understanding of the universe as a coherent, self-emergent reality.

Only when the human species knows the fundamental organic continuity between the universe, the earth, the emergence of life in its rich plenitude, and the evolution of human consciousness can humanity properly know itself and be appropriately guided in its future relationship with the planet. If in the past the human species has assumed a proprietary and exploitative dominance over the natural world, this has largely been a function of a radical ignorance of its own coherence with and derivative status within the unfolding story of the universe.[1] Not until humanity knows its own significance as the self-conscious modality of the universe will it be

sufficiently dynamized to make the decisive changes required to halt the ongoing deterioration of the earth community. A functional cosmology, in which the universe as primordial self-expressive reality is as much a psychic-spiritual as a physical-material process which becomes conscious of itself in human thought, is the necessity of the present moment (Berry 1988; Berry and Swimme 1992).

Within Mahayana Buddhism, the complementary traditions of the Tathagatagarbha and Alayavijnana represent a cosmology and corresponding anthropology that are strikingly contemporary. As we proceed I shall suggest English equivalents for these terms, but now it may suffice to say that together these two terms define a coherent understanding of the Buddha Nature, the Mahayana belief in the inherent potentiality of all sentient beings to attain the supreme and perfect enlightenment of Buddhahood. Applied to the human realm, they provide the rationale for and description of the Buddhist path as the process in which individual consciousness is transformed into perfect wisdom. The content of that wisdom is reality as a dynamic totality of mutually interdependent causes and conditions, an integral universe of innumerable, mutually interpenetrating, diverse forms and expressions of Tathata—"wondrous Being" or "Suchness"—Buddhism's term for the unqualified, indeterminate absolute reality.[2]

Such an understanding has been deeply rooted and consistently emphasized since the inception of the Buddhist tradition. The principle of pratityasamutpada, "dependent co-origination," conveyed the notion that the appearance and coming into being, the existence, of any particular thing is a dynamic, collaborative process of many other things. Nothing exists in and of itself but only as a context of relations, a nexus of factors whose peculiar concatenation determines the origin, perpetuation, or cessation of that thing. A line from the Pali Canon, revered by all the schools of the Buddhist tradition as an original statement of the enlightened founder himself, pithily formulates the fluid contingency which is the very nature of the phenomenal world:

> *This being, that becomes;*
> *from the arising of this, that arises;*
> *this not becoming, that does not become; from the ceasing of this, that ceases.*
>
> (Majjhima-Nikaya 2:32; Samytuta-Nikaya 2:28)

In such a universe, any element is the combined shape and apparent form of a specific number of other elements; its unique nature is to have none; its identity can be defined only as the expressive manifestation, the conditioned representation, of those other elements. Thus it was that the Buddha and the Abhidharma school of his followers taught that the worlds of persons and things were just so many clusters, groupings, literally "heaps" (skandhas) of five basic psychophysical elements. *Rupa*, or material form,

is the first and includes the four primary elements of earth, water, fire, and air as well as the five sense organs and their respective sense objects. The second is *vedana*, which represents all sensations—pleasant, unpleasant, or neutral—experienced through the contact of physical and mental organs with the external world. The third, *samjna*, refers to the perceptual experiences of noticing, naming, and recognizing. The fourth cluster, *samskara*, includes all good, bad, or indifferent dispositions, tendencies, volitions, strivings, impulses, and emotions. The fifth basic element is *vijnana*, or consciousness, as either pure awareness or the process of ideation and thought.

Through these five basic psychophysical elements, or clusters, early Buddhism identified existence as a thoroughly contextual process: no person or thing is an independent, self-subsisting reality but comes into being, persists, and dies as a given function of other factors; life perdures only as a complex aggregation of multiple conditions. From its origin, then, the Buddhist tradition reflects a conceptual framework rooted in the central intuition of an ecological perspective where nothing exists in autonomous isolation but everything is defined as the composite derivative and collaborate synthesis of other elements.

The failure of the human mind to adequately grasp the truth of dependent co-origination, or "the together rising up of all things," remained the consistent concern of Buddhist analysis. Ignorance persisted on the one hand in the projection of the ego as the discrete, self-consistent, self-individuating, and self-directing center and end of the individual personality and on the other hand as a tenacious belief in the autonomous status and independent sufficiency of all other entities or things. The painful alienation (dukha) between oneself and the world of persons and things is a function of that primordial ignorance which imputes a false self-derived and self-contained identity to persons and things.

The object of Buddhist soteriology or process of liberation was to bring that ignorance to an end. Through philosophical analysis and meditative wisdom the tradition never departed from its goal of exposing the radically contextual nature of reality, exposing the component parts, the heap of relations that give a thing its identity. A striking example of the relentless focus applied by Buddhism to reveal the mutual interdependence and combined aggregation that defines the existence of all phenomena is the text called *The Path of Purification* (*Visuddhimagga*) by fifth-century monk Bhadantacariya Buddhaghosa. One of the most influential scholastic commentaries, exhaustively detailing the types and methods of meditational praxis, this manual intensively discloses the feature common to its otherwise various subjects. Specifically, it contains innumerable references to, and precise instructions for, meditations on the inevitability and experience of old age, sickness, and death; on the subdivision of the human body into thirty-two parts, each with a specific function and relationship to the

others; on varieties of physical decomposition and decay; on the minute details of breathing and eating; and on a comprehensive correlation of each of the thirty-two parts of the body (both human and nonhuman) with one of the four primary elements of air, earth, fire, and water. But whether the meditations involve macabre concentration on a bloated and festering corpse or a more refined attention to the inflow and outflow of breath, all such exercises share a common purpose: to see reality as it is, as a realm in which nothing arises and comes into being of its own power but whose origin and persistence is a function of conditions, factors which are themselves products of other factors. Unifying the rather peculiar and at times exotic meditations is the universality of organic process. Whether it is the process of breathing, the process of age, disease, and dying, or the processes of decomposition and decay, the *Visuddhimagga*'s unremitting exposure of phenomena as organic aggregations of multiple constituent elements is designed to pierce the illusion of a world populated by autonomous beings and entities, extraneous and unrelated.

As Buddhism continued to evolve, around the first century of the common era the Mahayana phase of its development began. The creativity of this period would remain vibrant for some eight hundred years. I want to draw our attention to the significance of two complementary notions that emerged from Buddhist reflection during this time, those of the Tathagatagarbha and the Alayavijnana.[3] In and through these concepts the ecologically sophisticated description of reality in the principle of dependent co-origination assumed the status of a more coherent cosmology. The earlier Hinayana tradition had identified the precise delineations of phenomenal reality as contingent and dependently co-arisen. But, while the intense reductive analysis of persons and things into their clusters of component elements (skandhas) accurately reflected the web of multiple conditions which together define the identity of any particular phenomenon, the tradition neglected the universe as a cohesive, unified reality.

The focus was individual liberation of the mind from the ignorance that projected an illusory significance onto persons and things as absolute, unconditional realities in and of themselves. The goal of the path was to achieve freedom from the suffering and unhappiness (dukha) that arose from the subsequent attachments to those erroneously conceived phenomena.

With the evolution of the Mahayana schools, Buddhist reflection matured to a more expansive interpretation of the path and the nature of wisdom, revealing the truth of dependent co-origination. We shall now rely on a fifth-century text called the *Ratnagotravibhaga* (Takasaki 1966), which became the authoritative source for the theory of the Tathagatagarbha, a term that now needs some decoding. Garbha means "embryo," and Tathagata is an alternative designation for the Buddha. As such, the term came to signify the inherent capacity of all sentient beings to attain the supreme and perfect enlightenment of Buddhahood; all beings are

embryonic Buddhas (Tathagatas) by virtue of their innate endowment with the Tathagatagarbha. I want to avoid the obvious problem of weighing us down here with technical Sanskrit terminology, so I shall refer to the concept of the Tathagatagarbha as "embryonic consciousness," understood as the innate capacity of all beings to grow into and attain a more perfect, more comprehensive awareness, equivalent to that attributed to the Buddha. Looking for further specifications of this embryonic consciousness, we find important indications of it in a second-century text that became a primary resource for the fifth-century text that we are following (Wayman and Wayman 1974). In that earlier sutra the notion of embryonic consciousness was defined as a beginningless, uncreated, unborn, undying, permanent, steadfast, intrinsically pure reality which, when liberated from the defilements of ignorance that conceal it, becomes manifest as the Cosmic Body of the Buddha (Dharmakaya), coextensive with the entire universe. Put otherwise, the Cosmic Body of the Buddha is referred to by the term "embryonic consciousness" when it remains obscured by ignorance (Wayman and Wayman 1974, 104–5).

The implication of identifying embryonic consciousness as Cosmic Body is critical for articulating an adequate contemporary cosmology from within the resources of the Buddhist tradition. While enhancing the role of human consciousness, primary subjectivity is now understood as grounded in the universe itself in its religious symbolization as the Cosmic Body of the Buddha. The Buddhist path could now be interpreted as more than the mere individual struggle to overcome erroneous misconceptions and extricate oneself from the pains of ensuing attachments. With the theory of embryonic consciousness as Cosmic Body the path assumed its macrophase significance while simultaneously intensifying the value of its earlier microphase dimension. The universe, religiously conceived as the Cosmic Body of the Buddha, journeys to perfect self-consciousness as that totality, in and through the human mind. The progressive insights of the human mind into the nature of reality are the embryonic maturations in ever more exact self-awareness of that Cosmic Body.

As the Buddhist tradition continued to refine this basic cosmology, it further specified the ontological identity of the embryonic consciousness and the Cosmic Body of the Buddha as but variant modalities of one and the same unconditional, indeterminate, all-inclusive, nondifferentiating wondrous Being, or Suchness. The designations of embryonic consciousness and Cosmic Body are merely linguistic distinctions referring to wondrous Being as ultimate reality. When wondrous Being is fully self-conscious of its own integral totality as the primordially pure immaculate essence (dhatu) of all things, is perfectly self-aware as universal body, it is referred to as the Dharmakaya. Until it attains that ultimate self-disclosure, wondrous Being is fully present in all sentient beings in various embryonic stages of self-realization. The movement that characterizes

wondrous Being from embryonic consciousness to Cosmic Body is the necessary emergence of itself to itself in perfect self-knowledge. Indeed, our fifth-century text characterizes wondrous Being as Cittaprakrti, the innately pure Mind present in all sentient beings through which it recognizes itself as the wholeness of reality in the plurality of its forms.

The wisdom which perfects that ultimate self-recognition is nothing other than the truth of dependent co-origination, now reinforced by the doctrine of nonsubstantiality, or Emptiness (Sunyata). This term represented the insight of a rich literature within Mahayana Buddhism preceding the development of the cosmological scheme that we are here exploring. That literature was collectively designated the Perfection of Wisdom literature (*Prajnaparamita*) and includes such renowned texts as the Diamond Sutra and the Heart Sutra. The fifth-century *Ratnagotravibhaga* had to incorporate the doctrine of Emptiness from that earlier tradition and did so by correctly identifying Emptiness as equivalent to the fundamental principle of dependent co-origination. All things are empty of their own self-subsisting autonomy but exist as dependently derived and conditionally produced by a universe of multiple, interdepending factors. Far from denigrating the value of phenomenal reality, Emptiness identifies their true nature as dependently co-originating. With that clarification, the text advances its cosmological reflection by reviewing different modes of human insight into the nature of reality as empty. The varying perceptions represent the acuity with which wondrous Being as the innately pure Mind moves from embryonic self-awareness to perfect self-consciousness as the essential nature of all things as one Cosmic Body.[4]

It begins by noting the mindset of that group of persons simply designated "ordinary beings." Their crass materialism seizes upon persons and things as independent, discrete, self-subsisting entities. In them, wondrous Being's self-understanding is utterly opaque. Without any clue to the conditional status of phenomena as constituted by a vast web of interdependencies, such persons define themselves in terms of substantial egohood (ahamkara), and their relation to other persons and things is largely a function of their craving and possessive self-reference, that is, their sense of "mine" (mamakara). Because ordinary beings lack any sensitivity to the relative, determined, and conditional status of phenomena, the notion of nonsubstantiality, or Emptiness (Sunyata), is scarcely conceivable. Among persons with such a degree of ignorance, wondrous Being as innately pure Mind remains fundamentally obscure to itself.

The text then turns its attention to the classical position of the Hinayana tradition, as discussed above, and credits its analytic reflection on and critical awareness of phenomena as dependent and provisional. Differing from the gross superficiality of ordinary beings, representatives of the Hinayana (the sravakas and pratyekabuddhas) attained a genuine perception of the truth of reality. The adherents of that early Buddhist tradition cor-

rectly understood that persons and things do not exist in and of themselves. As fundamentally qualified by a whole series of causes and conditions, they are indeed empty and totally lacking in the permanence and substantiality accorded them by the ignorant majority.

Despite their initial success in overcoming the illusion of the gross substantiality of existent elements, the Hinayana adepts became entrapped by the very categories of their own analysis. They reduced phenomena to the major constituents of the five heaps or clusters of psychophysical elements. Some within the tradition further delineated those five into yet smaller subclassifications. In the process, however, they tended to devalue phenomenal reality as essentially marked by impermanence (anitya), suffering (dukha), absence of self (anatma), and impurity (asubha), and regarded it as a repulsive source of pain and sorrow. Initially more sophisticated and accurate in its insight into the nature of phenomena as derivative and dependent on multiple constitutive factors, the Hinayana erred by denigrating the conditionality and relativity of existence as itself unconditional. By absolutizing the classifications of its own analysis and its consequent descriptions of phenomena as impermanent, painful, without selfhood, and impure into ultimate facts, the Hinayana tradition never perfected the intuition of universal nonsubstantiality, or Emptiness. In its followers the self-comprehension of wondrous Being as the originally pure, undivided essential nature of phenomenal reality is aborted. Blocked by an ignorance that fragmented existence into certain fundamental, irreducible units, wondrous Being never conceives of itself as the undifferentiated coherence of the universal whole.

Following this critique, the text turns to its own tradition to censure the ignorance of certain novices to the Mahayana path. Unlike the "ordinary beings" and the followers of the Hinayana tradition, these are bodhisattvas, "enlightened beings." But among this group, who formally acknowledge the doctrine of Emptiness, are those who seriously misapprehend its genuine significance by conceiving it as some unconditional reality, transcendent and separate from the realm of conditioned phenomena. Reified as something to be attained outside of and beyond mundane reality, Emptiness so conceived implies the denigration of phenomenal existence. Misunderstood and clung to as a reality existing absolutely and independently of the five psychophysical elements and the entire conditioned world that is coextensive with them, such an Emptiness becomes yet another expression of ignorance.

An even more serious delusion occurs when the Mahayana doctrine of Emptiness is misapprehended as signifying utter nihilism. To assume that Emptiness means the actual unreality of phenomena and to dismiss their appearance as the mere product of an illusory imagination is a perverse distortion of the revelatory nature of Emptiness itself.

Here an important clarification must be made about the images so commonly used throughout the Wisdom literature in its teachings about Emptiness. As an example, consider a passage from the Diamond Sutra that refers to the emptiness of phenomena as stars, magical apparitions, clouds, dewdrops, bubbles, lightning flashes, or reflections of the moon in water.[5] The purpose of these similes is not to postulate the absolute nonexistence of things but only to deny the status of phenomena as independent, self-subsisting entities; the similes are comparative statements indicating a certain degree of reality, not unqualified assertions of a total nullity. Rather than denying the existence of such things, the emptiness implied by these images reveals the reality of phenomena as opposed to how they are perceived by the ignorant. Like stars, things, appearing as so many independent, ultimate realities, are distant, unreachable, unattainable, insignificant, and seen only in the darkness of ignorance; like magical apparitions, their semblance of individual, ultimate significance is a deception and the fraudulent pretense of ignorance; like dewdrops, their existence is temporary and evanescent; like bubbles, the factors of experience, while actual, are insubstantial and lasting but a moment; they are like a flash of lightning and as impermanent as clouds.

By disclosing the emptiness of an independent self-subsistence in all things, Emptiness does not imply their absolute nullity, or nonexistence. As the true nature of phenomena, Emptiness does not diminish the value of things but is the very mode by which their essential nature as a mutually interdependent, co-originating whole becomes manifest.

This is the understanding that defines the perspective of mature bodhisattvas. Genuinely enlightened, they skillfully avoid the errors of conceiving Emptiness as some ultimate reality existing independent from and transcendent to phenomenal existence or as something that suggests a total nothingness. Theirs is a consciousness in which wondrous Being attains a precise self-awareness. As Mind innately radiant, wondrous Being becomes actually so in them. Reviewing the vast and diverse realm of phenomenal existence, these bodhisattvas know all things as empty of essential distinction and separate particularity. Instead, their wisdom understands the coherence and totality of all things as one Cosmic Body.

Let us pause for a moment and note the overall significance of our text. Its clarification of wondrous Being in its dual modalities as embryonic consciousness and Cosmic Body is important to a Buddhist ecology. I stated at the outset that an adequate environmental ethic must be grounded upon a cosmology capable of rendering the universe as a coherent whole in which human consciousness is an intrinsic self-expression of that larger reality. Human concern for and protection of the earth community will be more carefully informed and appropriately guided when human consciousness comprehends its own significance as evolved from and dependent upon the entire cosmic process. That the universe may understand

its entirety in its innumerable particularities defines a clear purpose and singular responsibility for human thought and behavior. Such a cosmology and attendant ethic is indicated by the *Ratnagotravibhaga*'s general analysis of wondrous Being.

In the text, Buddhism suggests that wondrous Being is the movement toward its own self-revelation. It must come to recognize itself as the essential nature of all things. It can do so in and through the human mind, which, grounded upon and informed by it, attains an ever more exact insight into the nature of reality. From the gross materialism of ordinary beings through the more refined analysis into conditional relativity of the Hinayana tradition, past the mistaken notions of Emptiness of some within the Mahayana, the inherent tendency of wondrous Being to know itself as the perfectly pure essence—the indeterminate, unqualified Suchness of all things—embryonically moves toward perfect self-realization as one universal reality, or Cosmic Body.

In the idiom of an environmental ethic two fundamental positions have here been identified as utterly inadequate for animating and sustaining the behaviors that are necessary for the well-being of the planet and its many communities of beings. There is the obvious failure of the all-too-"ordinary" orientation that remains oblivious to the mutual interdependencies that make the being of one critical for the welfare of the whole. Disturbingly, the depredations from this common ignorance have now become global in their repercussions. The witness of the flower, exemplifying the essential contributory presence of moisture-bestowing clouds; pollinating bees, butterflies, and other insects; the wafting of the seed-bearing winds; and the multitudes of microorganisms nurturing the soil of its roots—that is, the flower as community—is a mode of perception that is all too rare.

But just as injurious is the morally vapid position that induces a neglectful indifference to the fate of the earth in the misguided pursuit of some spiritual reality like the misconceived Emptiness doctrine soundly repudiated by our text. In it, Buddhism castigates those human spiritual ideals that may entrance the mind with a fixation that blunts its awareness of and sensibility to the plight of other beings.

Unquestionably, Buddhism in its long historical evolution and culturally diverse spread is replete with meditational exercises which it unambiguously identifies as therapeutic to the afflictions that plague the human mind. A common dimension of such multiple praxes is the recuperative peace that restores the mind as it frees itself from the obsessions of desires, angers, fears, anxieties, and other preoccupations generated by any number of ego attachments. Learning to cultivate a more peaceful self-liberation by expanding the mind's awareness beyond the narrow barriers of its own self-absorption is a singular benefit and joy that Buddhism has always celebrated.

But our text cautions against infatuation with meditative states or notions of spiritual perfection that would denigrate the value of the earth community and lead us to abdicate responsibility for its fate. In this repudiation we hear the twofold dynamic of Buddhist meditative experience: stopping and seeing. To stop the mind in its painful compulsions that emerge from its confining and narrow self-addictions we must have a receptive, open attentiveness to and a clear vision of the presence and condition of absolutely everything in our world. The silent cultivation of uncluttered awareness realized on one's meditation cushion is a highly ethical preparedness for penetrating insight and sensitive responsiveness to both the wisdom and suffering of all things conceived as one's body. For that is what the cosmology of our text has instructed.

Now, having clarified somewhat the way in which cosmology implicates ethical concern and behavior, I briefly turn to another tradition of Buddhism known as the Vijnanavada, or Consciousness Only school, which reinforced the notion of reality as a self-reflecting whole and the status of human consciousness as intrinsic to that process.[6] According to this school, the universe in the plurality of its forms is the self-manifestation of wondrous Being through its designation as Alayavijnana, which I render Absolute Consciousness rather than its more literal and common designation as "storehouse consciousness." More specifically, the tradition teaches that the Absolute Consciousness contains universal seeds (bijas), which, as archetypal self-determinations, are actively and persistently projected by the Absolute as the innumerable forms of the phenomenal universe. The physical shapes and contours of the cosmos are in fact the universal self-particularizations of consciousness. The apparent solidity and uniform stability of these forms by no means invalidates their origin in and persistence as mere consciousness. The abiding character of matter attests to the uninterrupted continuity of the Absolute's self-manifestation.

The Vijnanavadin (Consciousness Only) tradition does not impugn physical consistency and concrete tangibility. Instead, these are the very forms in which Absolute Consciousness manifests itself. It is not the material solidity of empirical phenomena but only the notion or idea of their externality (apart from consciousness) that is disputed by the doctrine of Consciousness Only (see Brown [1991] 1994, 204–5; Chatterjee 1975, 74–75). The error is to misunderstand the primordial and sustaining reality of the Absolute Consciousness and to interpret the perceived objectivity of things as evidence of their independent self-subsistence. Yet that is what happens. Because of an inherent ignorance, individual phenomenal consciousness regards itself as an independent autonomous ego. Even though it evolves out of and is grounded upon the Absolute, phenomenal consciousness fails to understand its own derivative status.[7] Instead of recognizing the universal Absolute Consciousness as the generic animating principle of all things, the phenomenal mind misapprehends it as the

uniquely particular and exclusive center of its own discrete self-identity (i.e., as an atman). It misconceives itself as self-derived.[8] This mode of self-delusion (atmamoha) is accompanied by a correspondent self-conceit (atmamana) and self-love (atmasneha) in which the individual considers itself superior to all others in its possession of a unique selfhood, to which it develops a profound attachment.

Such fundamental misapprehension by the phenomenal consciousness and its consequent distortion of its own identity as an independent, self-subsistent reality in turn pervades its perception of all other persons and things. Its constant self-regard as an autonomous ego instinctively transfers to its apprehension and interpretation of the phenomenal world, which is then invested with a similar degree of self-reality. If the psychophysical organism is considered to be a discrete, self-determining center of unique personal identity (an atman), it is so over against a plurality of similarly unrelated egos and a world of unconnected, self-standing objects and things (dharmas).

This coordinate form of ignorance, which interprets the phenomenal universe as constituted by innumerable discrete particularities, independent from one another and from consciousness, is repudiated by the Vijnanavada tradition's continuity with the central intuition of dependent co-origination that had animated the entire development of Buddhist thought from its earliest expression. While earlier traditions had identified the dynamic through which all things come into being as derivatively dependent on a host of multiple conditions, the Vijnanavada stressed that their contingent interdependency is rooted even more fundamentally in the ultimacy of Absolute Consciousness, which projects and sustains the phenomenal universe as its own ideal manifestation and transformation.

But if phenomenal consciousness dependently originated from and is actively sustained by Absolute Consciousness, the reverse is no less true: the Absolute attains plenary self-awareness as the indeterminate, unconditional nature of all things in and through the human mind. Collectively, the forms of the phenomenal universe and of human individuality are the images (nimitta) in and through which Absolute Consciousness appears to and recognizes itself.[9] Because the structure of the phenomenal consciousness evolves from immanent, archetypal self-patternings (bijas) of the Absolute Consciousness, and because that phenomenal consciousness exists as the differentiated identity of the Absolute Consciousness, the perceptions of the phenomenal consciousness are the perceptions of the Absolute.[10]

Thus, in the cosmology expressed in the complementary notions of the Tathagatagarbha (embryonic consciousness) and Alayavijnana (Absolute Consciousness), the significance of the human mind is paramount. Even though it has an instinctive tendency to fragment reality into discrete, unrelated particularities of persons and things, that inherent ignorance is not its essential nature (svabhava) nor its essential mode of activity (akara).

Rather than being an absolute and definitive state, ignorance is but a qualified condition or an associated mental activity (caitta) of the human mind.[11] While human consciousness may be originally deluded about the nature of itself and the universe, it is not itself essentially delusive; it may well be the vehicle through which ignorance is manifested and perpetuated, but it is at the same time the very locus within which wisdom realizes its perfection. Just as the structure of human consciousness originates and assumes its form from the innate self-determinations (bijas) of the Absolute Consciousness, so too does the ignorance that accompanies it germinally develop from within the very ground of the Alayavijnana. But concomitant to and simultaneous with the seeds of ignorance there likewise exist innate seeds of wisdom (see Tsang 1973, 531–33), which actively inform the mind through various stages of progressive illumination. Moving from the initial stage of "moral provisioning" through the stages of "intensified effort" and "unimpeded penetrating understanding," wisdom embryonically matures, instructing the mind in the true nature of all things as *pratityasamutpada*, a universe of mutually interdependent coexistences emerging from and sustained by Absolute Consciousness.[12] In this process, wisdom perfects itself as it transforms phenomenal consciousness in a twofold form. The tenacity of ignorance in its projection of a multiplicity of independent, autonomous entities dissipates through the mature illumination of the universal equality wisdom (Samatajnana) and the profound contemplation wisdom (Pratyaveksanajnana). Conjointly, they illumine the mind, that it may discern precisely the unique features and peculiar characteristics of all things while at the same time comprehending their complete equality as the self-manifesting forms of wondrous Being.

What is critical to note from the perspective of an environmental ethic is that human consciousness is a product of neither ignorance nor wisdom; its natural condition is rather the very interplay of their mutual presence. As indicated in the theory of the Tathagatagarbha, Absolute Reality must come to know itself in the totality of its plenitude as the unconditional, indeterminate wondrous Being of all things. It can do so because, as Absolute Consciousness, it projects the plurality of the phenomenal universe as its own self-determinations, which it then recognizes as itself in and through human consciousness. Thus, the human mind, itself derivative and conditioned, nevertheless assumes its authentic status as the self-conscious modality of the Absolute. That the Absolute Consciousness "seeds" the mind with both ignorance and wisdom suggests that phenomenal consciousness is defined as the active interplay between the two. Fundamentally oriented toward and engaged in the understanding of the universe of which it is a part, human consciousness realizes itself in the necessary dialectic between an ignorance that perceives oneself and the plurality of all other persons and things as essentially discrete self-subsistent realities and the wisdom that delineates the emptiness and nonsubstantiality (sunyata) of

all things, comprehending their innumerable mutual interdependencies in their integrity as one universal body (the Dharmakaya). This movement of the mind from ignorance to wisdom, from crass materialism to the universe as sacred body, is the very movement of Absolute Consciousness from an implicit to an explicit self-awareness. Such a cosmology, defining the coincidence of human understanding of reality as the self-intuition of that reality, resonates from within the Buddhist tradition with the indications of contemporary physics and biology. It confirms their image of a primary reality that actualizes a concrete self-awareness in human reflection. Together with them it advocates urgently challenging humanity to free itself from distorted arrogance, to recognize itself as having originated in dependence on a reality more than itself, and to understand that it is conditioned by and coexists in dynamic interdependence with all things. Such a cosmology, grounded in universal Emptiness, would reinvigorate humanity, in an ethic of reflection upon and care for life in its entirety, as the species which can identify the integrity of the whole in the richness of its diverse particularities.

The four classical vows of the bodhisattva well express the serious commitment demanded by such an ethic at this moment in earth history. In their conceptualization and embodiment they may appropriately reinforce and illustrate the central intuition and significant challenges confronting the high ideals and practical concerns of the Endangered Species Act, the anniversary of which this reflection initially celebrated. Fully awakened to the severity and scope of planetary degradation, compassionately responsive to the suffering of vast communities of living beings whose identity he understands as his own, the bodhisattva affirms the fearless resolve to protect and liberate. Undaunted by a deep-rooted collective ignorance and greed and nurtured by the wisdom of the ten thousand things (dharmas) of the natural world, he unreservedly dedicates himself to the consequences of living in a universe that he daily embraces as his own body.

It is perhaps fitting to conclude with the words of the vow itself, intoned on a daily basis throughout the Mahayana Buddhist community: "Beings are numberless, I vow to free them. Delusions are inexhaustible, I vow to put an end to them. Dharma-teachings are boundless, I vow to perceive them. The Enlightened Way is unsurpassable, I vow to embody it."

NOTES

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1. Thomas Berry is the seminal thinker who has interpreted human cultural history and indicated its future development within the larger dynamics of the universe. See, for example, "The New Story" and his other penetrating essays in Berry 1988. More recently, he joined mathematical cosmologist Brian Swimme in an extraordinary collaboration (Berry and Swimme 1992).

2. Generally translated as "Suchness" or "Thusness," Tathata has been more recently rendered as "wondrous Being" by Masao Abe in his profoundly instructive collection of essays, *Zen and Western Thought* (1985).

3. The doctrine of the Tathagatagarbha is found in the *Srimala Sutra* and elaborately developed in the *Ratnagotravibhaga*. The *Lankavatara Sutra* and the later *Ch'eng Wei-Shih Lun* define and explain the concept of the Alayavijnana.

4. See chapters 10 and 11 of the *Ratnagotravibhaga* and Brown [1991] 1994, chap. 6.

5. See the *Vajracchedika Prajnaparamita* in Conze 1972, 68, and Brown [1991] 1994, 150–51.

6. The *Ratnagotravibhaga* delineated Tathata (Suchness) as the universal, immaculate essence of phenomenal existence, which as embryonically present in all sentient beings is referred to as the Tathagatagarbha. That the nature of Tathata is to determine itself in the coherence of its universal integrity was indicated by Cittaprakrti as a cognate expression of Tathagatagarbha. This designation became explicit in the *Lankavatara Sutra*'s identification of the Tathagatagarbha as the Alayavijnana, or Absolute Consciousness. The *Lankavatara Sutra* in turn became a critical source for the development of the Vijnanavada as exemplified for the present essay by the *Ch'eng Wei-Shih Lun* of Hsuan Tsang. See Brown [1991] 1994, 179–81; Tat 1973.

7. According to the Vijnanavadin tradition, human consciousness consists of a sevenfold modality. The first five sensorial consciousnesses of seeing, hearing, smelling, tasting, and touching represent the simple awareness of the respective data appearing before consciousness. It is the sixth, manovijnana, or mind consciousness, which is the unifying principle of that raw sense information as apprehended by the first five. It accounts for the constitution of objects within consciousness and their intelligibility or rationality. As the consciousness that perceives ideas, it is the faculty of formal conceptualization. Intellection proper is attributed to the seventh consciousness, the manas. It systematically categorizes information and acts upon it, pondering, calculating, and directing means to specific ends. Thus, it is the organ of conative intentionality and the source of ego identity, with its attendant craving, thirst, and desire. All seven modes of consciousness are grounded upon and evolve from the Alayavijnana.

8. This form of ignorance, atmagraha, is peculiar to the manas. See Brown [1991] 1994, 215ff.

9. For a more detailed explanation of nimitta as the self-manifested images of the Alayavijnana, see Brown [1991] 1994, 217ff.

10. According to the *Cheng Wei-Shih Lun*, the Alayavijnana and the sevenfold empirical consciousness are said to be simultaneous with and mutually present to each other and thus are neither identical to nor different from one another. See Tsang 1973, 131–33.

11. For a clarification of the distinction between svabhava and caitta as applied to consciousness in the *Lankavatara Sutra* and the *Cheng Wei-Shih Lun*, see Brown [1991] 1994, 223–24.

12. For a detailed explanation of the five stages, see Tsang 1973, 665–809.

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THE ROLE OF COGNITION AND FEELING IN RELIGIOUS EXPERIENCE

by Nina P. Azari and Dieter Birnbacher

Abstract. Inquiry into religious experience is informed by conceptualizations of emotion. Although a long history of theoretical and empirical work has provided considerable insight into the philosophical, psychological, and (more recently) neurobiological structure of emotion, the role of cognition and feeling in religious emotional states remains poorly conceived, and, hence, so does the concept of religious experience. The lack of a clear understanding of the role of emotion in religious experience is a consequence of a lack of an adequate interdisciplinary account of emotions. Our primary aim here is to examine the consequences of a properly interdisciplinary understanding of emotions for the analysis of religious experience. To this end, we note points of convergence between psychological, philosophical, and neuroscientific accounts of emotion and between such accounts and reports on the neurobiology of religious experience, in particular two recent human brain imaging studies. We conclude that emotions are richer phenomena than either pure feeling or pure thought and that, rightly understood, emotion affords religious experience its distinctive content and quality. Accordingly, we argue that religious experience cannot be reduced to pure feeling or pure thought. Rather, on our analysis, religious experience emerges as "thinking that feels like something."

Keywords: emotion; human brain imaging; neuroscience; religious experience.

One of the presuppositions operative in inquiries into religious experience is that religious experience has a necessary emotional component. A long

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history of theological and philosophical scholarship (especially within Christianity) shows that religious experiences such as are involved in religious worship or prayer (i.e., various forms of "religious state") are invariably characterized by emotional content (Martin 1987). This has led to the approach of studying religious experience by studying its emotional content, an approach not unique to empiricists but as well as of some philosophers of religion (for example, Proudfoot 1985). That is, once the emotional content of a religious experience has been determined, one can gain direct insight into the nature and structure of religious experience. However, this kind of approach relies on implicit preunderstandings of emotion, for how emotion is understood determines directly how religious experience is understood. Thus, an adequate understanding of emotion is crucial to conceptualizing religious experience.

Indeed, the role of emotion in religious experience remains poorly conceived, and, hence, so does the concept of religious experience (Martin 1987). This, we propose, is a consequence of a lack of an adequately broad interdisciplinary account of emotions as they apply to religious experience. We offer our work in this essay as an example of how rigorous interdisciplinary engagement can open up new meanings for both neuroscience and religious studies.

Our aim is to explore what the emotional nature of religious experience implies for the analysis of religious experience. To this end, we examine points of convergence between psychological, philosophical, and neuroscientific accounts of emotion, and between emotion theories and reports on the neurobiology of religious experience, most recently those based on human brain imaging technologies. As we will show, quite a number of conceptualizations of emotion important to the empirical study of religious experience are inadequate to account for the phenomenon in that they underrate the complexity of emotion. Such views inappropriately cast an emotional experience as a matter of pure feeling, thereby giving an account of religious experience as one-sided as that of a cognitivism, which, conversely, reduces religious experience to pure thinking or pure belief. Indeed, current psychological, philosophical, and neuroscientific theories understand emotions as far richer phenomena than either pure feeling or pure thought, thereby suggesting that religious experience cannot be reduced to pure feeling or pure thought. We conclude that, rightly understood, emotion affords religious experience its distinctive content and quality. On our analysis, religious experience emerges as "thinking that feels like something."

Complexity of Emotion: A Problem for Empirical Investigation

Theoretical and empirical work in psychology and neuroscience on emotion has enjoyed a long and fruitful history, rendering multiple theories

regarding the structure and biological underpinnings of emotion. Each empirical contribution is, however, conditioned by the needs set forth by empirical methodology, most important of which is the need for simplification of the phenomenon under investigation. Even as oversimplification (radical reductionism) has fallen out of favor in the contemporary experimental human sciences (Schilling 1973; Tolman 1996), there still remains a need to formulate parsimonious a priori operational definitions and concretely objectify the phenomena of study, and this inevitably leads to oversimplification.

Broadly conceived, there have been two views of emotion in play in empirical investigations of religious experience:

1. Noncognitive (feeling or somatic) theories. An example of a noncognitive account is a somatic, or peripheral, theory. On this view, emotions have a necessary physiological, noncognitive "core," and an emotion consists in an automatic and immediate ("pre-wired") reading off bodily states of arousal. The specificity (content) of an emotion is given in a precognitive awareness, or sensing, of bodily events. Cognitive elements such as thoughts and beliefs are secondary to an independent "root," bodily mediated, preconceptual feeling. Thinking need not play a causal role in producing behaviors, and the perspective of the experiencer is not crucial; the subject is conceived of as a passive recipient (James 1884; 1890; Zajonc 1980).

2. Cognitive (appraisal) theories. According to these, bodily arousal, even if required on some accounts, does not contain the "content" of a specific emotion. Rather, the specificity of emotion is given in some kind of cognitive processing (an evaluation or appraisal, a causal belief, involving learning, memory, or mental representation), and the perspective of the experiencer is crucial to the experience. In this sense, all emotions are cognitive in structure (Schachter and Singer 1962; Scherer 2001; Lazarus 1982; 1984; Rolls 1999).

How emotion is understood by each theory is directly informed by how each theory conceives of the relation between feeling and cognition (Eich and Schooler 2000; Lane et al. 2000). In an extreme noncognitive view, such as a somatic theory, emotion has nothing to do with cognition; the two belong to quite distinct domains. An extreme cognitive account (for example, social-constructivist) posits that emotion essentially is—or is reducible to—a cognitive construction.

Given the tendency toward simplification in empirical work, it is not surprising to find that early forms of each theory tended to radicalize their claims. An early noncognitive conception of emotion is the so-called James-Lange Theory, a somatic view that combines the efforts of William James (1884) and Carl Lange ([1885] 1922). James-Lange theory has played an important role in the empirical study of religious experience. For James in particular, emotions and feelings are identical in the sense that both simply

"happen to" a passive subject and are directly and incorrigibly read off bodily changes occurring automatically in response to some environmental stimulus (James 1890, 2:449–50). All emotional experience can thus be reduced to a peripheral and specific bodily response, which is then automatically and unerringly registered in one's internal world.

Empirical evidence has accumulated to challenge the James-Lange theoretical account of emotion (Eich 2000; Rolls 1999). One notable weakness is the inability of this theory to explain why some stimuli elicit emotional response and others do not. Moreover, a number of studies have shown that the peripheral changes often produced during emotion are not distinct enough to carry the information needed to experience subtly different emotional states. Rather, the particular emotion that is experienced seems to be determined less by the particular bodily arousal state of a person than by the situational context and the stimuli to which this person is currently exposed.

Such challenges have led to a cognitive theory that has been particularly important to the study of religious experience: a common and early version of attribution theory (Schachter and Singer 1962). According to this formulation of attribution theory, the content (specificity) of an emotion is taken to be reducible to a particular kind of cognitive construction. On this account, two factors contribute to making an emotion: an initial undifferentiated bodily arousal followed by a causal belief concerning the source of that arousal feeling. Although an emotion may be triggered by a state of bodily arousal, attribution theory holds that its essence is a pure thought—more specifically, a belief about the cause of one's state of undifferentiated bodily arousal. Thus, while *a* bodily arousal feeling is necessary for an emotion, it does not determine the specificity of the emotional experience. Indeed, the feeling going with emotion is empty of (cognitive) content. On an attributional account, the cognitive aspect of an emotion consists in a rational process, a causal explanation (Schachter and Singer 1962). By the mid-1970s this view was dominant in the study of emotion (Eich 2000).

Neither theorization has stood up to critical scrutiny (cf. Eich 2000; Lazarus 2001; Schorr 2001). At present, there is a broad consensus among emotion theorists that emotion cannot be reduced to either a pure and distinctive bodily arousal (feeling) or a pure cognitive construction (thinking) (Eich 2000; Scherer 2001; Ben-Ze'ev 2000; Nussbaum 2001); both participate in emotion. The current view is that there may well be some so-called basic emotions, involving principally bodily factors and no cognition at all, that are built into human evolutionary nature, prewired and automatic (Niedenthal and Halberstadt 2000), but that these are best understood as only aspects of emotion and not the full phenomenon. Similarly, most theorists accept that many emotions, especially in humans, rely to some extent on cognitive processes and are largely culturally and so-

cially determined (Scherer 2001). *Cognitive* is in this context is taken to refer, at the minimum, to beliefs about or an interpretation concerning an object or a state of affairs.

Importantly, this conceptualization does not specify that *cognitive* necessarily refers to an act of knowing, although it can. Nor does such an understanding commit to a particular structure of belief or interpretative process. Consistent with current neuroscientific views, *cognitive* includes both conscious (explicit) and nonconscious (implicit) processes (Marshall 1987). As a consequence, most theorists today maintain that human emotion is, at the very least, cognitively mediated. That is, the specificity of an emotion involves some kind of evaluation, appraisal, or judgment concerning the context in which the experience occurs. In sum, emotion as conceived in the contemporary literature is understood to be a separate mental faculty, with its own structure and rules of operation, engaging both noncognitive and cognitive processes (Eich and Scholer 2000; Rolls 1999). However, radically simplistic noncognitive and cognitive views of emotion have played a dominant role in the empirical study of religious experience.

The move to oversimplify has not been unique to the empirical agenda. Indeed, an analogous tendency can be observed in philosophy. Historical and recent theories of emotion have tended to stress one or the other single component, with the result of reducing the complexity of emotion. Descartes, who offered an early somatic-type account, stressed the part played in emotions by bodily factors, thereby reducing the subjective feeling involved in emotion to an immediate read-off of bodily response. Spinoza, who gives emotion and the mastery of what he calls passive emotions a crucial role in the strife for inner independence, was well aware of the part played by cognitive factors but paid little attention to the feeling component. In phenomenological theories of emotion like those of M. Heidegger (1963), J. P. Sartre (1939), and H. Schmitz (1969), the feeling content is fully reflected, but there is an inadequate representation of bodily factors in the production and expression of emotional states.

What has this simplification as regards emotion meant for the phenomenon of religious experience? From a James-Lange theoretical understanding of emotion, the emotional content of religious experience consists in a "pure" feeling that comes before and apart from any thoughts and beliefs. The feeling is the core of religious experience. Religious experience emerges as fundamentally noncognitive, a preconceptual, private, immediate, incorrigibly known feeling that is totally independent from thought and beliefs (James 1902; Otto 1926; Schleiermacher 1958). Moreover, the external stimulus that incites the bodily arousal is critically important for the specific character of an emotion (that is, there are presumed emotion-specific stimuli).

In contrast, more recent attempts to conceptualize religious experience as cognitive have relied heavily on an attributional account of the emotions (Proudfoot 1985; Spilka and McIntosh 1995; Spilka, Shaver, and Kirkpatrick 1985). From a commonly understood attributional view, the cognitivity of religious experience consists in a religiously formulated causal claim (belief) regarding the (religious) source of an otherwise anomalous physiological arousal, the "feeling" (Proudfoot 1985). Here religious experience, as all experience, emerges as essentially cognitive, and the structure of the cognitivity takes the form of a causal belief.[1] In contrast to a somatic account, the feeling aspect of the experience—while similarly necessary, preconceptual, and consequent upon bodily arousal—does not provide information concerning specificity of the experience. Correspondingly, stimulus specificity is not the key to specifying an emotional experience on an attributional account, but neither is the cognitive content as such (what the experience is about). What is central to specifying an experience as religious is a causal explanation that the subject believes is most appropriate to the situation.

The difficulty with any simplistic account of emotion is that it may render only a particular aspect of emotional experience and, hence, an inadequate picture of religious experience. Moreover, any "discovered" aspect of emotion emerges directly as a consequence of a chosen perspective or method of inquiry (empirical, phenomenological, introspective, theologically apologetic, and so on). Clearly, for a full account of emotional experience—and, correspondingly, a more adequate account of religious experience—one must take seriously both its external, or public (behavioral, physiological), and its internal, or private (phenomenological, introspective, subjective felt quality), character. Neither purely somatic, nor purely cognitive, nor purely phenomenological theories of emotion are adequate in and of themselves. All human experience, emotional and religious, is a complex matter of embodied thinking and feeling. The question is, how and what does each—thinking and feeling—contribute to an experience? It is interesting to see what new insight may emerge for emotional experience, and consequently, for religious experience, when various theoretical accounts are integrated across traditionally disparate disciplines.

Taking the Complexity of Emotion Seriously

By combining the accounts of emotion provided both by analytical philosophy of mind (Alston 1967) and phenomenology (cf. Sartre 1939; Schmitz 1969), one obtains the following list of aspects, or components, of emotion:

1. A *cognitive* component, which provides the intentional object and/or the belief content of an emotion. For many types of emotion, it is characteristic that they have an intentional object and are directed at some-

thing in the outer or inner world, for example fear or jealousy. Usually, the intentional objected is provided by a belief about the object—the belief that a lion is standing in front of me, for example, or that my husband has a mistress.

2. An *affective* component, which carries with it a feeling that may be more or less specific. Fear "feels" different than jealousy, even if they have the same intentional object and result from the same belief. By their feeling content, most emotions can be straightforwardly assigned a value on the scale from positive to negative, though sometimes a felt quality consisting of both positive and negative valences can coexist.

3. A *motivational* component, which connects cognitive content and feeling content with certain bodily reactions (such as movements of flight) and with impulses to act in appropriate ways.

4. A component of bodily *arousal*, which can take any value between a weak readiness to react to a full-scale agitation. It is this component which is often felt to be a disturbance of normal mental and bodily functioning (an aspect stressed by Descartes, for example).

5. A *transformational* component, by which the perception of the inner and outer world is changed by emotion, so that the world is seen to mirror the emotional state of the subject even without his or her being aware of the emotion itself. This aspect of emotion has been succinctly expressed by Wittgenstein: "The world of the happy is different from the world of the unhappy" (Tractatus 6.43).

Two warnings are in order at this point. The first is that all these aspects of emotion are purely abstract. The ability to distinguish these aspects does not mean that they can be separated in reality or are supposed to be causally independent. On the contrary, there seem to be so many mixtures of and dynamic interactions between them that David Hume, in the eighteenth century, was completely right when he talked of emotions in terms of a "chemistry" of emotions.

The second warning is that the aspects on this list are exhibited only by what might be called emotions in the full sense. Emotions in the full sense do not exhaust the range of emotional phenomena. In addition, there are a number of emotional *states* that meet only some of the conditions on the list but, nonetheless, are clearly related to emotions by appropriate family resemblances. For example, an emotional state, which must not be confused with emotion as such, is *mood*. Mood shares with emotion the aspects 2, 3, and 5 but not 1 and not necessarily 4. Being in love, for example, can be interpreted as a mood and distinguished from the emotion of love by the absence of a necessary intentional object. Likewise, bad temper is a mood distinguishable from anger by not being directed at anything in particular.

An emotional state that has aspects 1, 3 and 5 but does not exhibit aspect 4 (and only rarely 2) is an emotional *attitude*. Emotional attitudes

were called by Hume "calm passions" and were distinguished from "violent passions" by their lack of excitement and agitation (Hume 1888, 417). Calm passions do not manifest themselves primarily in physiological parameters or in episodic feelings or sensations but in their role of motivating action. Because they are nonviolent and "cause no disorder of the soul," they tend, as Hume noticed, to be mistaken for reason and misinterpreted as purely rational. We may add that calm passions are real passions, especially for the reason that they determine a specific view of the world. This aspect is mentioned by Sartre, whose analysis of emotion as a "transformation of the world" can easily be extended to emotional attitudes. Emotional attitudes imply certain interpretations of given data, and these interpretations are more stable in time than the interpretations accompanying more episodic emotions, which mostly are of short duration. In emotional attitudes, as in emotion in the full sense, the data provided by raw experience are interpreted in the light of the dominant attitude. The pessimist and the optimist ascribe different meanings to the same data; the anxious man is more frightened than the fearless man by the same phenomena. Usually, these interpretations go together with valuations: attitudes, like benevolence and malevolence, trust and distrust, optimism and pessimism, clearly influence the valuations we put on events in the world.

There is a further trait commonly attributed to emotions that is not in the list because it is not, strictly speaking, one of its components: the essentially passive character of emotions. Emotions happen to us; we have only very limited control over them. This is true even for their cognitive component, which in the context of emotion typically consists of thoughts that come to us unwilled and not of thoughts we actively and deliberately engage in. Whoever is frightened of a lion does not typically choose to be frightened of the lion, nor does he or she choose to believe that there is a lion standing in front of him or her whenever there is, in fact, one standing there.

In several respects, the results of neuroscientific studies of emotion fully confirm the philosophical analysis. The study of the neurobiological basis of emotion has a long history (LeDoux 1996; Rolls 1999). But it is only recently, with the advent of relatively noninvasive human brain imaging techniques such as PET and fMRI, that new insight has been forthcoming concerning specifically human emotional experience. Neuroimaging findings suggest that emotion is a much more complex matter than had been conceived on the basis of work in nonhuman species. One result of these studies is that the close relation of emotion and cognition suggested by a philosophical analysis seems to have its counterpart, on the neuroscientific level, in a close interaction of emotional and cognitive systems. Although most probably a separate domain of human brain functioning, with its own rules of processing (Eich 2000), emotion is nonetheless tightly bound up with cognition.

Statements like this have to made with due caution. The identification of certain areas of the brain or of certain neural systems as "emotional" or "cognitive" inevitably rely on incomplete and indirect evidence stemming from earlier nonhuman animal and lesion studies. Claims based on neuroimaging studies of emotion (or, for that matter, of any other aspect of conscious experience) cannot be more reliable than the evidence supporting the prior correlation of brain structures with kinds of conscious events. Though there is no circularity involved here, it remains for future research to confirm the hypothetical correlations used in drawing on neuroimaging studies in clarifying the nature of emotion.

Neuroscientific accounts of emotion sometimes conform to the above philosophical conceptual structure without using quite the same terminology. One example is the theory of E. T. Rolls, who offers one of the most current, systematized, and comprehensive neuroscientific accounts of emotion. On Rolls's view, emotions can be classified according to whether they are produced by (1) the presence of positive reinforcers (pleasure, elation, ecstasy) or negative reinforcers (apprehension, fear, terror), or by (2) the absence of positive reinforcers (frustration, anger, rage) or a termination of negative reinforcers (relief) (Rolls 1999, 63). This aspect of Rolls's conceptualization of emotion is fully compatible with the affective component (aspect 2) emergent from the foregoing philosophical analysis. According to Rolls, emotions necessarily have cognitive content—specifically involving an appraisal or evaluation—at least to a certain degree, but the cognitive aspects involved in emotion may or may not be at the level of conscious awareness. In principle, they can remain totally unconscious (1999, 62).

Does Religious Experience Reduce to a Feeling, or to a Thought?

It is plausible to assume that there is a close relation between emotion and religious experience. But what aspects of emotion play a role in religious experience? Investigations into the phenomenal aspects of religious experience invariably render reports consisting in some affective, felt dimension (Smith 1995). Though thoughts and beliefs play an important role in religious life (Pye 1994), religious belief differs from factual belief by its emotional quality: believing in God is more than believing that God exists. The element that sets off "believing in" from "believing that" can be identified as an element of trust (Kutschera 1990, 122). Trust in God is different from a mere belief in the existence of God or from the belief that God is trustworthy. It is a positive emotional attitude toward the object of trust. The phenomenon of religious belief is not exhaustively accounted for by the description of its propositional ("doxastic") content. However, although believing in the existence of God is more than believing that God

exists, the doxastic belief that God exists is an element in the belief in God and, correspondingly, in religious experience.

Therefore, even an account of religious experience in terms of religious emotion does not reduce this emotion to a "pure" feeling. Indeed, if there were a uniquely pure religious feeling (involving no cognitive character), it would have to be present in all cases of religious experience and absent in all other cases. Otherwise it would not correspond to the specifically religious element in religious experience. It must be doubted, however, whether the feelings picked out by the "sentimental" theories are able to meet this condition. The problem is that the feelings of the Sublime or of the awe-inspiring identified with the essence of religion are not specific enough to demarcate religious experience from other kinds of deep and forceful experience. Feelings of awe occur not only in the sphere of religion but also in the spheres of art, nature (wilderness), and romantic love. So, although religious experience has a feeling aspect, it is to be doubted whether this is the exclusive role for emotion in religious experience, that religious experience can be justifiably reduced to a feeling. Experiences of mystical union, transcendence, or conversion, which attest to an extraordinarily intense felt dimension, may be associated with some types of religious experience, but they are not the core of religious experience and are far from being its necessary elements.

An analogy to the "sentimental" theories in the psychology of religion may be found in recent empirical investigations of religious experience. With the exception of two very recent reports, neurophysiological studies on religious experience have been grounded on, and support, a noncognitive view. According to such studies, religious experience is conceptualized as an "abnormal" brain state, which at its core is caused by automatic, preconceptual, immediate, lower-level affective brain processes (Persinger 1983; 1984a, b; 1993; 1997; Puri et al. 2001). The brain system thought to be the substrate of such primitive affective processes is the limbic system. Propositions such as the recent "limbic marker hypothesis" of religious experience derive from such an understanding (Joseph 2001). According to this hypothesis, only if the limbic system is active during the experience can one conclude that religious experience has occurred. The absence of limbic activity means that religious experience was not present. One consequence of such interpretations regarding the neural basis of religious experience is that one can "locate" religious experience in the brain (and, some claim as well, locate neurophysiologically "religion" or "God"; see Alper 2001) and that the essence of the experience is independent of the experiencer—the subject plays no role in making the experience what it is. Indeed, the recent controversial proposal of a "God center" in the human brain (Joseph 2001) follows directly from this interpretative scheme. According to this approach, religious experience emerges as a root feeling, unmediated by cognitive interpretations or attitudes, preconceptual, pri-

vate, immediate, incorrigibly known by a pure feeling, totally independent from thought, beliefs, or any type of cognitive activity. Religious feeling is driven by an external stimulus and is subsequently registered by a passive yet consciously aware subject. Whatever thoughts or beliefs with which the experience may be associated are secondary to the pure feeling.

This view is not compatible with the results of two very recent neuroscientific studies (Azari et al. 2001a; Newberg et al. 2001), nor is it supported by current theories of the emotions. Andrew Newberg and his colleagues performed a neuroimaging study (using SPECT) of Buddhist meditation. They reported that brain areas involved in so-called higher-order cognitive processes (complex visual perception, attention, orientation, and verbal conceptualization) were integral to the experience (for example, areas such as the posterior parietal lobe, thought to be involved in creating mental representations of the self and orientation in space). Based on this study and earlier work, Newberg and others have hypothesized that religious and mystical experiences are mediated by complex patterns of neural activity involving brain structures of the autonomic nervous system, the limbic system, and neocortical areas (occipital, parietal, and prefrontal cortex). Thus, different mystical (or religious) experiences[2] are marked by variable and relative contributions of each of these structures (Newberg, d'Aquili, and Rause 2001, 117ff.). On this account, one cannot simply "locate" religious experience or God. Central to this view is that the meaning of the experience for the subject is critical (Newberg, d'Aquili, and Rause 2001, 111). In this regard, their work (and the interpretation thereof) supports the view that religious experience is at the very least cognitively mediated. More specifically, on this account, the essential cognitivity of such experiences is functionally multidimensional, involving seeing the world as a whole, reducing the whole into analyzable parts, abstract thinking (generating theories, beliefs, assumptions), mathematical calculation, causal explanation/interpretation, binary reduction, and assignment of what exists (that is, what is real) (Newberg et al. 2001, 46ff.).

Nina Azari and colleagues (2001a) studied a group of self-identified Protestant Christians. These subjects held the conviction that the biblical text was the literal word of God. PET scanning during states which they themselves identified as typical religious states showed a brain activation pattern that corresponded to their individual self-perspectives. The activated brain areas were those associated with learned cognitive activity, sparing limbic areas.[3] This study provides support for the view that religious experience is a cognitively mediated phenomenon, for which the perspective of the experiencer is central.[4] Even as these findings suggest that religious experience is a matter of thinking (cognitive activity), however, they also reveal that such an experience *feels* uniquely religious, even without evidence of a concomitant autonomic arousal (that is, of limbic activity).

Obviously, the feeling aspect of the experience was bound up with the thinking and did not necessarily come before it. In this sense, religious experience emerges as "thinking that feels like something."[5] Taken together, these recent neuroscientific findings suggest that religious experience is, at the very least, cognitively mediated, for which the perspective or interpretation of the experiencer is crucial, and that the cognitivity of religious experience is not just about explaining (giving a causal explanation for) a bodily arousal (a cognitively empty "feeling").

The understanding of religious experience resulting from these findings is that religious experience is a complex state in which beliefs and feelings interact in a way similar to what above was called an "emotional attitude." An emotional attitude is not an emotion in the full sense involving bodily arousal, but, as in emotion, cognition and feeling, and the motivations and interpretations they entail, are intimately conjoined. By virtue of its cognitive content, religious experience is cognitively structured and socioculturally conditioned. Its concrete nature depends on learned religious beliefs and concepts stored in memory as mental images.

Belief and Attribution and Their Role in Religious Experience

What are the nature and structure of the cognitive aspect of religious experience? Can the cognitivity of religious experience be adequately accounted for in terms of an *attributional* understanding of emotional experience?

The cognitivity of religious experience does not go so far as to make religious experience a purely rational activity, an activity of explicit judgment. Religious experience does not necessarily involve judgments conceived as datable mental acts. Nonetheless, it presupposes a certain frame of thought and interpretation. Religious experience operates within a *field* of believing; the belief affords the space for the experience. Hence, the belief does not as such enter the scene but functions as a background condition guiding the way the believer interprets and evaluates his or her relation to the world as well as to the being to which this person feels religiously related. The distinctive cognitive trait of religious experience is not an explicit judgment but an attitude and a presupposed framework of interpretation. The religious person "sees" the world and him- or herself differently from the nonreligious person. The difference between the religious and nonreligious view of the world is not a difference in factual information or factual expectations but in attitudes to the same class of facts. The dispute between the theist and the atheist is, unlike the dispute among scientists, not a dispute between rival hypotheses but between rival ways of seeing the world (Wisdom 1964). Each of these perspectives is bound up with different feelings and different evaluations.

The results of our work here do not support the proposal that religious experience always or necessarily involves an explicit conscious judgment

about specifically religious objects. In this sense, they also do not support an attributional account of the cognitive dimension of religious experience. On an attributional understanding of religious experience, expanding B. Weiner's attribution theory of emotions (Weiner 1986), religious experience would involve the attribution of a subjective experience (a cognitively contentless feeling) to external causes such as God, who is thereby assumed to be not only the intentional object but also the causal source of the experience. Alternative contemporary cognitive formulations of emotions and recent neuroscientific research have called into question the adequacy of an attributional account of the cognitivity of emotion (Scherer 2001; Lazarus 2001). In brief, the cognitive aspect of an emotional experience need not be limited to a causal belief about the origin of the experience. The cognitivity of an emotion is best construed more broadly as an appraisal or evaluation; thus, a causal belief or judgment is but one kind of appraisal or cognitive activity that plays into an emotion (Ochsner and Barrett 2001, 50). In this regard, the cognitivity of religious experience need not be limited to a causal belief.

Such a conclusion does not imply that there are not particular examples of emotional experience for which causal attribution is typical or even essential. Indeed, that there are such experiences was already noticed by Spinoza, who defined love, for example, as "joy, accompanied by the idea of an external cause" (Ethics, III, 13 Sch.; Birnbacher 1999). It is characteristic of love that the object of love is at the same time interpreted as its cause, at least as its central cause. Love, however, is not the only emotion with attributional features. The person who is in a rage is persuaded that this rage is owed to the same thing he or she is furious about. Similar attributions are characteristic of all reactive emotions, such as gratitude, resentment, revenge, indignation, and joy.

Because of their cognitive component, emotions can be judged as adequate or inadequate, justified or unjustified, depending on the extent to which the belief—which is part of the emotion—is held by an observer to be justified. Plato introduced the concept of "false pleasures" in his dialogue *Philebos* precisely to open up the possibility of rational criticism of emotion. His point was that even such (purportedly) nonrational items of human psychology as desires and emotions are not entirely beyond the reach of critical reason. Even those parts of our nature that we share with other animals are transformed in the human in such a way that they are partly amenable to rational criteria.

One consequence of including causal attribution in the cognitive component of emotions, however, is a corresponding increase in the risk of going wrong. The element of causal attribution adds to the ways in which an emotion can be misguided, inadequate, or irrational.[6] There are, as far as we see, three additional kinds of error:

1. Contrary to what the subject thinks, the object is not the full cause of the emotion but only a triggering object or event, the main cause lying in other factors, internal or external to the subject.

2. Contrary to what the subject thinks, the object does not causally contribute to the emotion but is only a screen on which the emotion is projected. In this case, all causal factors lie outside the object, either within or without the subject.

3. Contrary to what the subject thinks, the object does not exist (or does not obtain) but is a delusion or illusion wholly or partly caused by the emotion itself.

The first model is roughly that of Freudian *cathexis*: a process triggered by an object which then plays the role of the focus to which a preexisting emotional energy is directed.

The second model is exemplified by Faust's "intoxication" with Gretchen after having drunk the love potion. The witch brewing the love potion rightly foresees that "he will see Helena in any woman." For Faust, however, Gretchen, the first woman he happens to come across, is "the one," inexchangeable and irreplaceable. Romantic love, according to this model, is an illusion (though probably a highly useful illusion; see Frank 1988) of uniqueness. Any other woman would have fulfilled the function of serving as a projection screen for an emotion whose causal roots were wholly within the subject.

The third, and most radical, mode explains the subject's belief directly by his or her emotion. According to this model, the belief in the very existence of the object is a product of the emotion itself. A well-known example for this model is the dictum by Statius, *primus in orbe deos fecit timor*, which explains the assumption of the reality of gods by independent feelings of fear, which are given a fictitious object in order to transform them into emotions and make them cohere with the rest of the subject's view of the world.

With respect to religious experience, all three models have been covered by different schools of thought in the philosophy of religion. The first is what might be called *positive deism* (Leibniz), the second *negative deism* (Epicurus), and the third *projectionism* (Feuerbach). For the positive deist, God is causally active in the production of the emotions directed toward God, but only in a very indirect way. On this view, God does not enter into any personal relation with the individual, so emotion is not directly caused by God but indirectly by the sum of past events leading up to the present. For the negative deist, God exists but does not enter into any relations with believing subjects, even indirectly. For the projectionist, God does not exist, but belief in God can be explained as a projection of strong emotions into the unfathomable depths of the universe.

Attributional accounts of emotion have their merits both in the philosophy and the psychology of religion. Accordingly, we grant that there are

a number of special kinds of religious experience that are obvious candidates for such an analysis, such as experiences of being inspired by a divine source or conversion experiences in which the new believer feels "seized" by the transcendent force to which he or she is converted. From the perspective of the nonbeliever, the emotions associated with these kinds of experiences, however forceful and compelling for the believer, are simply misguided by presupposing a false premise.

We do not believe, however, that an attributional account of emotional experience along these lines is broad enough to adequately account for the breadth and depth of religious experience. What emerges from our interdisciplinary inquiry, engaging philosophical, psychological, and neuroscientific perspectives, is a richer and more complex picture. Religious experience can be characterized neither as pure feeling nor as pure thinking. Just as emotional experience emerges as a complex matter of both thinking and feeling, so does religious experience show itself as a matter of "thinking that feels like something." In this regard, our work here is an example of how rigorous interdisciplinary engagement can open up new meanings for both neuroscience and religious studies. While neuroscientists will gain fresh insight into the topics of cognition and emotion and broaden their field of acceptable topics of inquiry, religious-studies scholars will acquire new insight into the concept of religious experience.

Notes

1. It is important to note that, while James assimilated religious experience to an emotion (and, hence, claimed that the emotional component of religious experience was a "pure" feeling), those who have proposed an attributional account of religious experience do not intend to assimilate religious experience to an emotion as such.

2. Newberg and his colleagues focus on mystical versus religious experiences, even though they make reference to both in their interpretations and theorizations.

3. It is presupposed that localization is an important clue to the nature of neural process concerned. We are well aware of the fact that this presupposition can, if carried to an extreme structure-function localization interpretation, conflict with current understandings of how the human brain is functionally organized—i.e., in terms of complex, functionally interacting *systems*. Indeed, one ongoing tension in the analysis of neuroimaging data is that of describing brain activity in terms of both structure-function relations and functionally interacting networks (Horwitz et al. 1999; 2000).

4. It is important at this point to comment briefly on the degree to which our analysis renders religious experience a fully public (observable) or a fully private (not observable) matter. Because religious experience has a cognitive side, it cannot be, as F. D. E. Schleiermacher (1958) would have it, a radically private matter, inaccessible to investigation, or an aspect of human experience that has a special language and domain all its own. But, at the same time, while it is true that religious experience is a cognitively mediated phenomenon, this does not make it less private in the sense that it need be totally transparent to others. In this regard, religious experience as such is not a piece of behavior or simply a practice. It may be associated with certain practices, such as worship or prayer, but it is not identical with them. Religious experience, then, is not fully publicly observable—though ascription of this experience, as of any other experience, stands in need of "outward criteria" (Wittgenstein 1997). But neither is it totally inaccessible in the sense that it cannot be communicated or is devoid of a content that might be communicated.

5. Further data analysis (Azari et al. 2001b) provided information that supports the view that religious experience as such cannot be reduced to any specific brain region or collection of regions.

This interpretation relies on the presupposition that brain function is afforded by complex patterns of neural interconnectivity, known as a "connectionist" or "network" conception of brain activity.

6. At the same time, it adds to the ways in which we might be held responsible for the adequacy of our emotions.

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FREEDOM AND NEUROBIOLOGY: A SCOTISTIC ACCOUNT

by Guus Labooy

Abstract. With the aid of some Scotistic conceptual distinctions, I develop a way of meeting the apparent deterministic sway of neurobiology. I make a careful distinction between formal and material freedom. Formal freedom, the ability to will or not to will a certain state of affairs regardless of whether it can be effectuated, remains, even if our material freedom to effectuate it is hampered by neurobiological mechanisms. These conceptual findings are linked with contemporary empirical research on obsessive-compulsive disorder and the possibility of volitional modulation of cerebral function.

Keywords: freedom; neurobiological determinedness; philosophy of psychiatry; Scotism.

Empirical findings of contemporary neuroscience suggest that human behavior is caused entirely by neurobiological mechanisms. Our commonsense view of freedom and responsibility then seems illusive. For Christians this raises even more worries for the obvious reason that these empirical data seem to endorse all kinds of already existent deterministic and physicalistic persuasions, views hardly compatible with the Christian faith. Obviously this constitutes a major philosophical issue: How can we account for human beings as both neurobiologically determined and free?

For a long time, the dominant way of addressing this problem was some sort of nonreductive physicalism (NRP) linked with compatibilism. In NRP, unrelenting physicalism is softened by pressing the point that the mind, however determined by our physical state, still cannot be reduced to matter, just as a painting like Rembrandt's *Nachtwacht*, though it consists of physical matter, cannot be reduced to that substance. Compatibilism,

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the close associate of NRP, declares freedom *compatible* with NRP's inherent determinism by pointing out that the real meaning of being free is having success—clearly an evolutionary concept of freedom—or having the experience of the absence of constraint. So, according to most kinds of compatibilism, free acts, however determined they are, are spontaneous and socially successful acts, devoid of any experience of constraint. However, NRP leaves many questions unanswered, and it has been argued that fifty years of physicalism brought the philosophy of mind to a blind alley (Haldane 2000, 301–11). According to many, determinism, NRP, and the associated compatibilism fail to provide an adequate, commonsense understanding of freedom. We need to step beyond these conceptual and ontological boundaries and survey a new, broader horizon. Leaving further philosophical analysis of the various sorts of physicalism aside (see Labooy 2002), in this contribution I attempt to show that the philosophy of Duns Scotus offers some decisive conceptual clues for the analysis of the data of neuroscience and free will.[1]

This proposed linkage between neurobiology and Scotism may sound rather far-fetched. However, we should not forget that the Franciscan John Duns Scotus (1266–1308) was "one of the most able and acute thinkers Britain has produced" (Copleston 1972, 213). After entering the Franciscan order, Duns Scotus lectured at Oxford, Paris, and Cologne and soon became known as the "*doctor subtilis*." "Of a critical turn of mind and gifted with an ability to discover fine distinctions and shades of meaning, he possessed at the same time a power of constructive systematization" (Copleston 1972, 213). In what follows I take advantage of this "ability to discover fine distinctions and shades of meaning," for his able mind focused on the issues of freedom, contingency, and necessity. In fact, he provided us with some decisive conceptual and ontological tools necessary in order to face the modern challenges of neurobiology and neurophilosophy.

The Scotistic analysis of freedom is firmly rooted in the Augustinian account of the human being as a free individual whose real freedom, under the present dispensation, is still concealed. One day it will be fully revealed and fulfilled in a freely acknowledged though divinely worked regeneration: freedom has to be recreated and restored by grace. At the same time, our dispositions, habits, and desires will not be put aside in this view; on the contrary, by being redirected they will be purified. Just as Augustine states in his confessions: "Our hearts were made for Thee, O Lord, and they will not rest 'til they rest in Thee" (I, 1). Thus, the Augustinian account of the human being is essentially a balanced view acknowledging desire and freedom, dispositional longings and free will, or, more scientifically speaking, neurobiological dispositions and freedom. Duns Scotus was the first important philosopher to provide for an in-depth analysis of this wonderful human constitution.

I begin by exposing the apparent deterministic dilemma more broadly. As a former physician, I have always been interested in the field of psychiatry. I therefore state the actual dilemma in psychiatric terms. After a short account of the concept of disposition, I then explain the important distinction between formal and material freedom, a Scotistic heritage. Next I address issues of neurobiology, applying the newfound conceptual tools to an actual psychiatric disease and to the philosophy of neuroscience.

The Dilemma

The issue of neurodeterminism runs like a fundamental anthropological dilemma through the entire field of psychiatry. Stephen Mitchell, speaking of psychoanalysis, has formulated the problem as follows:

> From its inception psychoanalysis has been plagued by the problem of the will. In one sense, the content of the mind (both normal and pathological) seems to be a causal product, shaped by past events, constitutional givens, and current influences. In another sense, the content of the mind seems to be chosen, reflecting firm convictions and deep commitments (both conscious and unconscious). How can these two ways of thinking about the mind be reconciled? Is human thought part of a causal chain or is it self-initiating and freely generated? (Mitchell 1988, 239)

What is true of psychoanalysis also applies to biological psychiatry, and from the biological point of view these questions seem to become even more urgent. Nancy Andreasen comments, "The biological perspective seems to replace one type of determinism (the psychoanalytical—GL) with another, which may seem even more awesome and overwhelming" (1984, 253). These two dimensions of reality—the two semantic fields that appear to clash in the quotation from Mitchell—should be analyzed. What precisely is a "causal chain"? What is it to be "self-initiating and freely generated"? I approach the first semantic field with the concept of *disposition* and the second with the concept of *freedom*. Can these concepts be consistently elaborated and combined with each other?

Contingent Dispositions

The concept of disposition plays a central role in twentieth-century philosophy of mind and functions prominently in the modern sciences. It conceptualizes fixed patterns in reality. That is to say, dispositions describe "how things . . . would behave in certain circumstances" (Crane 1996, 2). With the concept of disposition we are able to account for all kinds of causal chains, including all neurobiological mechanisms. Needless to say, if we adopt a deterministic concept of disposition, the prospect for authentic freedom looks dark. So although this contribution is not focused on the analysis of disposition, we must address the concept briefly.

We all acknowledge that human beings have many biologically anchored dispositions and desires. These intertwined mental and biological desires, being important forces in human life, could still be combined with human freedom: we could picture these dispositions as motives, and the essential thing about motives is that we are supposed to select and value them. They are forces that constitute our innermost nature or identity, powers we either use and embrace or reject and counteract. Those who believe that these propelling forces are deeply deterministic in nature are doomed to accept compatibilism. We therefore need a nondeterministic, or contingent, concept of disposition.

I assume such a contingent concept of disposition here and will briefly describe its more precise nature.[2] I think that all kinds of biological and physical causality, even physical dispositions like the combustibility of fuel, are nondeterministic, or contingent, in character. The kernel of this thought is the insight that causal relations are created. They are, therefore, contingent; they could have been different (synchronically[3]). To argue in a rather Humean way, with logical tools already present in most medieval texts: We acknowledge a real distinction between causal relations in physical reality and necessary relations. A suitable example of the latter is the relation between "bachelor" and "not being married." Obviously, dispositional relations are not marked by the strict necessity of such logically necessary relations. Neither do they fit in with still another form of necessity, *ontological* necessity. An ontologically necessary state of affairs is a state of affairs that could not have been otherwise (technically speaking, occurs in all possible worlds; see Bradley and Swartz 1979). Causal relations, however, are relations in their own right: the effect is never ontologically necessary, not even in physical relations, because contingent causal mechanisms can never result in ontologically necessary states of affairs. Something that is itself contingent cannot produce a state of affairs that cannot be different (is necessary). This applies to all kinds of natural dispositions, regardless of whether they are physical or biological in nature. Clearly the difference between physical and neurobiological dispositions lies in the fact that the latter are much more malleable (see Labooy 2002, chap. 5). Thus we might obtain a first intuitive grasp of contingent dispositions.

The term *nomic* or *physical* necessity, as contrasted with *logical* or *ontological* necessity, often is used to refer to the sort of lawlike causation discussed here. Although I think that this terminology is somewhat misleading because it dubs a contingent causal relation "necessary" (albeit physically necessary), this distinction aligns with what I have in mind when I speak about contingent physical and biological dispositions.

A possible misunderstanding needs to be mentioned. I do *not* have in mind a God-of-the-gaps kind of freedom. It is not the case that the brain's causal circuitry has some weak spots in its inner mechanism where free-

dom should seek to make its fortune. The point is rather that the concept of "necessary causal relations" bewitches our mind, leaving behind heavy sediments of rigid causal metaphors. However, "necessary causal relations" just do not exist, for they are causal, not necessary. Our neurobiological circuitry is apt by nature to propel us in some direction or other, but at the same time it is compliant to a certain degree. Thanks to the malleable nature of our neurobiological state, we might even suppose that it could be reworked by free will, if free will happens to exist. For even without the deterministic flaw contained in several theories of natural causality, our commonsense experience does seem to question the existence of real freedom. We need only think of all kinds of coercion by inner or outer forces.

Let us therefore concentrate on the link with freedom, for developing a contingent causal relation in biology or neurobiology is not tantamount to a solution to the problem of freedom. Nondeterministically caused is not the same as freely caused. Even if we allow for a contingent framework of dispositional causality, the task remains of combining it with freedom. Scotus' philosophical heritage gives us some important conceptual clues here. I will apply Scotistic conceptual distinctions to the philosophy of neuroscience.

The Distinction between Formal and Material Freedom: A Franciscan Heritage

In the Franciscan tradition, freedom is regarded as an essential property of the human will; the will as such is therefore free. The conceptual harvest of that tradition has been neatly digested in Eef Dekker and Henri Veldhuis's article "Freedom and Sin: Some Systematic Observations" (Dekker and Veldhuis 1994, 153–61). I will use this analysis of freedom in the debate on neurodeterminism. Their contribution turns on the conceptual distinction between *formal* and *material* freedom. Formal freedom is the freedom of willing or not willing, apart from whether it is possible to realize the object of choice. Only with respect to material freedom does the question arise of whether we are also able to effectuate the volition, that is, whether we also have the freedom to realize the object of choice. The cardinal point is the distinction between the will and the potential for effectuating the will. This is a legacy of the Franciscan tradition of "faith seeking understanding."

By way of illustration, consider those who are locked up in prison. Such persons have the freedom to will their release or not. If they will their release, however, they are unable to effectuate it. They have formal freedom but no material freedom. Formal freedom turns on the insight that a volitional act as such also has a possible alternative. Thus, I define it as follows:

Formal freedom is the ability, essential to humans, synchronically to will or not to will or to will the opposite of a certain state of affairs p, *regardless of whether* p *(or* –p*) can be effectuated.*

I mentioned earlier that freedom is regarded as an essential property of the human will. This definition attributes the essential aspect more precisely to *formal* freedom. Only formal freedom is essential to all humans, and we cannot lose it. Not even the Fall deprived us of it.[4] However, in this definition we have a new concept, briefly encountered when speaking about contingency in the last section: the term *synchronic*. This concept is connected with the pivotal Scotistic concept of *synchronic contingency.* Let me elaborate on this, because it plays a decisive role in the definition of formal freedom.

For Scotus, a state of affairs *S* is possible if it could also, synchronically, not have obtained. Formally, it can be expressed thus:

$$S \text{ at } t_1 \text{ and possible } -S \text{ at } t_1.$$

This implies a revolution in modal logic in relation to Aristotle; what is at stake is the very meaning of the term *possible*. In the Aristotelian model, the concept *possible* refers to *alternative options at different moments:* Ontologically and conceptually there can be no place for *synchronic*, unrealized possibilities. This in fact is the famous Aristotelian "principle of plenitude": No genuine possibility can remain forever unrealized (Knuuttila 1982; Hintikka 1973). According to this modal principle, the notion of an unrealized, synchronic alternative to the actual being-the-case of *S* is inconsistent. If something really is a genuine possibility, it has to be realized somewhere on the axis of time. If it is never realized, it was not a genuine possibility, only an illusion. So, according to the Aristotelian modal theory, talk of unrealized, synchronic alternatives to the actual being-the-case of *S* is a chimera.

However, if for any and every state of affairs *S* there is no synchronic alternative, every state of affairs *S* is (synchronically) necessary:

> But if, at the same point in time at which p is the case, –p is impossible, the implication is that, for that moment, p is necessary. . . . Thus, in the Aristotelian model, contingency means no more than change over time, a change which consists of the succession of states of affairs that are in themselves necessary—so that the change itself is therefore also necessary. (Dekker and Veldhuis 1994, 154–55)

This important quotation makes it clear that mutability should not be identified with contingency. Often, however, the two are confounded, which leads to confusion.

In short, Duns Scotus is credited with unveiling the true nature of contingency, that is, *synchronic* contingency. The common notion that contingency consists of the possibility of *change over time* is shown to be illusive. The possibility of change over time does not ensure real contingency.

With regard to my definition of formal freedom, the fact that someone could have willed otherwise is conceptualized in synchronic terms: it concerns a synchronic possibility, a synchronic alternative to the actual willing *p*. The diachronic view of contingency, which often remains implicit, is thereby rejected. The importance of this apparent detail of synchronic contingency in the definition of formal freedom can now be shown. The concept of formal freedom implied the ability to will *p* or –*p*, regardless of whether *p* (or –*p*) can be effectuated. But it makes no sense to define formal freedom as the ability to will or not to will a certain state of affairs *p* if this very ability does not exist because willing *p* at t_1 is necessary. If there is only an exclusively diachronic alternative for willing *p*, then willing *p* is necessary at t_1. It is true that in this case an alternative possibility of willing –*p* at t_2 obtains; even so, this secures only mutability, not contingency. For, obviously, willing –*p* at t_2 is likewise necessary. The additional question of whether we are also able to *effectuate p* has become irrelevant, for the willing of *p* is now itself necessary. Formal freedom cannot exist if all states of affairs are synchronically necessary. So much for the theory of synchronic contingency of the *doctor subtilis*: it is in fact the ontological and modal precondition for a consistent noncompatibilist concept of formal freedom.

Apart from the concept of formal freedom there is also the concept of *material* freedom: One cannot always effectuate everything that one wills. I define:

Material freedom is the property, accidental to humans, that they can effectuate a certain state of affairs p.[5]

A major difference from formal freedom is the fact that material freedom is accidental. Sometimes we can leave prison if we want to, but at other times we cannot. Humans have formal freedom essentially, but material freedom is limited. Formal freedom is a yes or no concept. Animals do not have it; humans do. Material freedom is gradual: unlike formal freedom, there are degrees of material freedom. Some, for example addicts or prisoners, experience a serious limitation of material freedom. Others experience a wide range of material freedom: they can effectuate whatever they want. True material freedom, however, according to Scotus' tradition of faith seeking understanding, is a gift of grace and an eschatological category. Then, at last, we have learned to will the only right thing!

With this conceptual distinction at hand, we can clearly see that *limitations to our actions are not yet limitations of the will.* The prisoner cannot leave, yet he has formal freedom: does he want to leave prison or not? The drug addict cannot stop her addiction, but she can decide whether or not she *wants* to stop. This was recognized by Harry Frankfurt in his famous paper ([1971] 1982, 5–20) where he made a distinction between the addict who was fighting addiction and the wanton who was not.[6] Formal

freedom is not affected when material freedom is limited. The occurrence of constraint does not affect the very core of our will, the formal freedom to will or not to will *p*, regardless of the ability to effectuate *p* (or *not-p*). Yet, because formal and material freedom are often confounded, this important distinction remains unnoticed, and consequently the occurrence of constraint is used to argue for the absence of free will.

In conclusion, at least three "important systematic ideas" (Dekker and Veldhuis 1994, 155) should be included in the conceptual analysis of freedom: (1) the theory of synchronic contingency, (2) the power of will, which can produce a volition in a synchronically contingent way, and (3) the distinction between a volition and the factual effectuation of the object willed. Given (3), it may be asked why we speak of formal and material freedom and not simply of the capacity for willing and the capacity to effectuate our will. Would that not bring us more directly to the heart of the distinction? Despite the simplicity of this suggestion, there is good reason to employ the technical terminology of formal and material freedom. It has to do with the fact that *will* is a broader concept than formal freedom. Formal freedom is (analytically) a property of the will, but *will* has another meaning as well. It has the meaning of a tendency or desire. In "the will to believe" we can distinguish the dispositional aspect of desire together with the aspect of decision. In "the will of the people" the aspect of desire is even more prominent. So at least these two meanings are covered by the concept of will—it encompasses both formal freedom and the dynamic aspect of desire. This is the motivation behind the use of the more precise concept of formal freedom.

We should be on guard, however, lest this more technical terminology lead us astray. We should not get the impression that formal and material freedom are two different types of "act centers" in the soul. Such confusion can be avoided if we keep in mind that the formal/material distinction turns on the simple fact that to say that *p* can be willed is not the same as saying that *p* can be effectuated. This careful distinction between formal and material freedom is pivotal in the debate on neurodeterminism.

Excursion: Contemporary Neuroscience

This Franciscan analysis of freedom enables us to state clearly again that limitations to our actions are not yet limitations of the will. The prisoner example illustrates this point. Now, the central idea is that we can apply this conceptual distinction to the immanent level, the level of neurobiological processes, which have a conscious, psychological side as well.

To those unfamiliar with neuroscience, this may sound strange. Why not distinguish more sharply between the mental and the neurobiological realms? Weren't we trying to follow Duns in "discovering fine distinctions and shades of meaning"? Here we must enter briefly into the modern

findings of neuroscience. It has increasingly been shown that the mental realm has firm neurobiological underpinnings. This, in fact, helped prompting the sake of all sorts of monism and physicalism, like NRP discussed earlier. In order to explain this kind of empirical research, let me describe in brief a research project of a leading American psychiatrist, Eric Kandel.

Kandel and his coworkers conducted tests on the Aplysia species, a kind of sea snail. They gave repeated electric shocks to these animals and then observed their behavior. It turned out that flight behavior could be linked to changes in the molecular biology of the snails. The study yielded the conclusion that "the molecular biological structure of sensitization [a specific form of chronic anxiety behavior] in the Aplysia sea-snail has been unravelled" (Glas 1991, 176). Starting from such findings, Kandel wishes to search for a common ground between the perspectives of learning theory and neurobiology. He speaks of "a molecular alphabet of learning" and "a basic molecular grammar underlying the various forms of anxiety" (Kandel 1983, 1282).

It should not surprise us when empirical research like this is forged into a philosophy of mind and a philosophy of psychiatry. In fact, in 1998 Kandel himself published an article with the challenging title "A New Intellectual Framework for Psychiatry." It summarizes the current thinking of biologists about the relationship of mind and brain and reads like a comprehensive philosophy of neuroscience and psychiatry. Kandel expresses his basic tenets in five principles. The first is that "All mental processes, even the most complex psychological processes, derive from operations of the brain. The central tenet of this view is that what we commonly call mind is a range of functions carried out by the brain. As a corollary, behavioral disorders that characterize psychiatric illness are disturbances of brain function" (Kandel 1998, 460; Labooy 2002, 33). The presence of a physicalistic, reductionistic frame of mind is apparent here. Kandel would fit well into the range of NRP theorists. Although we are not compelled to yield to his metaphysics of physicalism, we do need to account for these kinds of empirical data. Contemporary neuroscience reveals that neurobiology constitutes a very important part of our behavior and psychology: our ordinary desires all have a neurobiological substructure, and our behavior is firmly rooted in our biology. How are we going to account for freedom *and* this sort of neurobiological determinedness?

A Neurobiological Prison

Having touched lightly on the wealth of research in contemporary neuroscience and biological psychiatry, let us return to a conceptual analysis of freedom. Pivotal to my analysis of freedom was the insight that limitations to our actions are not yet limitations of the will. Formal freedom is just not affected by constraint. Let us apply this Scotistic tool to the intertwined mental and neurobiological realm.

We often acknowledge our desires and wishes. Sometimes, however, we feel that they have enslaved us. To quote Paul: "For that which I do I allow not: for what I would, that do I not; but what I hate, that do I" (Romans 7:15 KJV). To translate this passage into terms of current neurobiology, Paul admitted that the causal dispositions of neurobiology became a sort of prison to him. But we can see that neurobiologically prompted mental limitations are not yet limitations of the will, analogous to the case of the prisoner: the limitation to his actions was not yet a limitation of his will. Evidently, Paul might as well have assented to that which he hated. To put it another way, mental constraints are not yet volitional constraints. The crucial point is that our mental dispositions, closely linked to neurobiology as they are, constitute a dynamic force that we commonly avow but sometimes dislike. Disliking them does not mean that we can always oppose them successfully. However, drawing the conclusion that we are therefore unfree lacks conceptual precision. The human experience of constraint does not affect our formal freedom. It only shows a lack of *material* freedom in that particular situation: we cannot effectuate a certain state of affairs *p*. Would anyone dispute the human ability to oppose or accept a particular habit of mind?

Let us draw some implications. In the human ability to oppose or accept a particular mental habit, the difference between formal freedom and mental processes manifests itself. Mental processes, although they may give the impression of being the bedrock of freedom, are not to be identified with formal freedom. On the contrary: mental habits such as being suspicious are dispositions. The difference from formal freedom comes to light when we ask ourselves whether we are going to accept or reject a certain way of thinking or mental habit. This goes even further: not only mental habits but mental or conceptual activity as such must be distinguished from formal freedom. Our intuitive identification of conceptual activity on one hand and freedom on the other is shattered once and for all when we realize that formal freedom involves an unrealized synchronic possibility—that is, to will $-p$. Of course, unrealized possibilities are in no way part of conceptual activity, although our conceptual activity, *if* we had willed the alternative $-p$, would certainly have been involved. But it was not, because we did not will $-p$. Thus, mental or conceptual activity does play a role in formal freedom, but we cannot describe formal freedom *in terms of* conceptual activity, because it involves unrealized possibilities.

Let us face a common objection. According to common sense and our analysis of formal freedom, Paul is free in his decision either to fight his enslavement while anticipating his deliverance or to accept his concupiscence (Romans 7:8). A compatibilist could argue that even this kind of freedom is determined and therefore illusive. This opponent might argue something like this: "You might invoke the concept of formal freedom, and, admittedly, it all fits in very well, but how do you know that it actu-

ally exists? What proof do you have that reality is like this? What makes you think that formal freedom is not triggered by neuronal processes we cannot control?" To my mind, the odds turn against this reasoning, and the burden of proof is on the compatibilist. For the strength of compatibilism is not that it aligns with common sense; it surely does not. According to common sense, we really have a choice of our own in situations of internal conflict like Paul's, and our dignity as human beings is bound up with this genuine ability. To my mind, therefore, compatibilism is just a provisional solution for the riddle of determinism. It only attains some probability when we are impelled to yield to determinism, for example when formal and material freedom are confounded and, consequently, real freedom seems to dissolve in the face of the experience of constraint. However, if we are able to explain the common experience of addiction by distinguishing between formal and material freedom, the burden of proof is on the side of compatibilism. We should be realistic, like Paul: we cannot change ingrained habits overnight. But whoever declares that we cannot even rise to the *virtue* of not willing them is under the influence of philosophical misanthropy.

A Neuroscientific Test Case: Obsessive-Compulsive Disorder Research

We have applied the formal/material distinction to the area of mental dispositions, to mental habits with their underlying "basic molecular grammar" (Kandel 1983, 1282). And, thanks to the research of Jeffrey Schwartz (1999, 115–42), we are in the fortunate situation of being able to apply these Scotistic tools to empirical research even more thoroughly.

Schwartz directed research on the phenomena of obsessive-compulsive disorder (OCD). To give an example of this mental disorder: Some persons cannot avoid thinking of the possibility that their hands are badly contaminated. So they constantly wash their hands. They may be able to suspend such compulsive thoughts for short periods of time, but only with tremendous effort. Then their thoughts return inexorably to that one obsession.

Like Paul's afflictions, this condition can be analyzed with the help of the distinction between formal freedom and the factual mental inclination. The obsessive thought pattern is a good example of a mental disposition. This mental disposition is firmly rooted in neurobiological dispositions, as neuroscience has found. In OCD, the *direction* of the mental process is disturbed insofar as it is obsessively fixated. Yet, although the patient is factually or virtually unable to direct her thoughts elsewhere, she can still *will* it formally. As a human being gifted with formal freedom, she must choose between rejecting her obsession or trying to settle for it. Of course, if she chooses to reject it, the redirection of her thinking is (virtually)

ineffectable. This does not affect the fact of her formal freedom, however, just as the impossibility of escaping from Alcatraz does not affect the formal freedom of the unfortunate prisoner.

There is, however, a surplus value of Schwartz's research on OCD, because it confirms our theory of freedom in two ways. First, in Schwartz's research emphasis is placed on the importance of the will in the therapeutic process, and second, Schwartz traces the effects of his patients' wills on their neurobiology.

In his research, Schwartz discovered that OCD is associated with the disorganized neuronal circuits of the basal ganglia, a particular part of the brain stem. However, patients trained in alternative behavior can begin to 'put' new neuronal circuits in place. Evidently, this requires great effort, for patients are overwhelmed by a tremendous, unspecified anxiety, which they formerly contained only by submitting to the urge to wash their hands. In the behavioral therapy developed for this class of patients, the will plays a key role. Schwartz speaks of the *volitional modulation of cerebral function*. He studied the mental dispositions with their underlying neuronal circuits involved in OCD, yet he held that persons remain capable of redirecting their thoughts through sheer will power, even if that means initially having to swim against the tide of the mental disposition. This ability is exactly what Schwartz's team targeted in the therapeutic process. Over time, the alternative line of thinking and acting generates a new neuronal circuit, so that the healthy reaction sought by therapy becomes progressively easier. These changes were also measured neurobiologically (Schwartz 1999, 124). Our conceptual analysis with its linkage of dispositions and freedom provides a solid conceptual basis for this neurobiological and clinical research in the field of OCD. The new way of thinking, initiated by formal freedom, finally results in new "wiring"—new neuronal circuitry in the basal ganglia! Schwartz's basal ganglia and Scotus' basal analysis of freedom go hand in hand.

Conclusion

I have argued that the Scotistic distinction between formal and material freedom is pivotal in analyzing the problems of neurobiology and freedom. Using these concepts, we are able to account for both freedom and dispositional causality. Denying neurobiological dispositions that drive and sometimes even enslave us would be sheer blindness. However, concluding on the basis of neurobiological constraint that we are unfree is simply not justified, for then we confound formal and material freedom. Thus, I support a combination of freedom and lawlike causation that differs crucially from compatibilism in that it acknowledges formal freedom as the ability to will or not to will a certain state of affairs, regardless of whether it can be effectuated. This formal freedom constitutes the kernel of the human will and is central to the development of a philosophical

anthropology (see Labooy 2002). This legacy of medieval analysis, stemming from the attitude of *credo ut intelligam*—"I believe so that I may understand"—was fruitfully applied to contemporary philosophy of neuroscience.

The first universities developed out of the medieval paradigm of "faith seeking understanding." Since the Renaissance, in increasing intensity, science has developed a new, self-sufficient, often even antagonistic concept of self-identity. In this essay, however, concepts stemming from the Christian tradition of faith seeking understanding have deepened our comprehension of the results of contemporary science. Faith sparked Scotus' key concepts and modal innovations—tools used here for a thorough and consistent analysis of the neurobiological dilemma, a dilemma hitherto mostly "resolved" by yielding to determinism and compatibilism, a priori persuasions not normally acceptable to common sense. My linkage of Scotus' and Schwartz's basal analyses is meant to aid the gradual restoration of the old basal paradigm of the relation between faith and science: *credo ut intelligam.*

Notes

1. Obviously, compatibilism could be linked with other brands of determinism as well, including theistic determinism. The Scotistic analysis I propose is of major importance in the construction of an alternative to these deterministic views as well.
2. Elsewhere I have developed a more precise concept with the help of possible world semantics. See Labooy 2002, chap. 4.
3. More on this in the next section.
4. This does *not* amount to Arminianism, that is, the thought that our free choice is a sufficient condition for our conversion; for, although we are formally free to will perfect obeisance to God, we are not materially free to do so. In this dispensation, as sinners, we cannot effectuate this formal freedom without God's grace.
5. The concept of material freedom concerns the presence or absence of a limit to the possibilities for action in a particular possible world. See Labooy 2002, chap. 6.
6. "Even though he is no longer free to do what he wants to do, his will may remain as free as it was before" (1982, 90). This is an important insight, which can be corrected, clarified, and integrated by our Franciscan position: corrected and clarified, because Frankfurt's position is neutral with regard to determinism. Associated with this is the fact that Frankfurt does not succeed in clarifying just what *volition* or *free will* is.

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DOES GOD PLAY DICE? INSIGHTS FROM THE FRACTAL GEOMETRY OF NATURE

by Paul H. Carr

Abstract. Albert Einstein and Huston Smith reflect the old metaphor that chaos and randomness are bad. Scientists recently have discovered that many phenomena, from the fluctuations of the stock market to variations in our weather, have the same underlying order. Natural beauty from plants to snowflakes is described by fractal geometry; tree branching from trunks to twigs has the same fractal scaling as our lungs, from trachea to bronchi. Algorithms for drawing fractals have both randomness and global determinism. Fractal statistics is like picking a card from a stacked deck rather than from one that is shuffled to be truly random. The polarity of randomness (or freedom) and law characterizes the self-creating natural world. Polarity is in consonance with Taoism and contemporary theologians such as Paul Tillich, Alfred North Whitehead, Gordon Kaufman, Philip Hefner, and Pierre Teilhard de Chardin. Joseph Ford's new metaphor is replacing the old: "God plays dice with the universe, but they're loaded dice."

Keywords: chaos and complexity; contemporary theologians; evolution; fractal geometry; fractals; genetic algorithms; loaded dice; polarity; randomness and law; science and religion.

Albert Einstein once said, "I am convinced the Old One [God] does not play dice" (Jammer 1999, 222). Huston Smith, whose book *The World Religions* (1991) has sold over a million copies, stated, "I do not believe that God could have created us in his image by the mutations of the genes" (Smith 2000). New findings about the fractal geometry of nature, chaos, and complexity challenge these negative statements about the statistical nature of the physical world (Gleick 1987). Einstein and Smith reflect the

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old metaphor: chaos and randomness are bad. Scientists have recently discovered that many phenomena, from the fluctuations of the stock market to variations in our weather, have the same underlying order. Natural beauty in mountains, plants, and snowflakes reveals a new fractal geometry characterized by the complex interplay between randomness (symbolized by dice) and global determinism (which loads the dice) (Mandelbrot 1983). Darwin's theory of evolution is similar to fractal analysis: the randomness of mutations and global natural selection. We shall see how old metaphors are being replaced by the new, such as one by chaos theorist Joseph Ford: "God plays dice with the universe, but they're loaded dice" (in Gleick 1987, 314).

"Noise is good," says Robert Hilborn (2000; 2001). Random noise added to a signal can increase its detectability in a system having a threshold. A familiar example is a hearing test in which one is asked to press a button as soon as the sound is loud enough to be heard. The noisy hiss added to the coherent sound signal enables it to trigger the hearing threshold. Thus, a lower-level signal with noise can be detected better than one without noise. Of course, the noisy hiss can not be so large as to drown out the signal. "A little noise is good" is a more precise statement.

The Fractal Geometry of Nature

What might appear as random noise has in some cases been discovered to have an underlying order. For example, the fluctuations of the stock market obey fractal statistics (Peters 1994). A number of physicists are using this analysis as an investment strategy to make money on the market (Bass 1999). Nature offers many examples of fractal statistics: branching in our lungs and in plants; variations in the flooding of the Nile river, of rainfall, and of tree-rings (Peters 1994).

Fractals have the property of self-similarity in that the parts are in some way related to the whole. In the fractal, or Sierpinski, triangle (Figure 1), the one central triangle has sides that are 1/2 that of the large one in which it is enclosed. The three second-generation triangles have sides that are 1/4 of the large one, the nine third-generation triangles have sides 1/8 of the large triangle, and so on. The scaling factor between generations is 1/2.

We will now play the Chaos Game to generate the fractal triangle. First, we *randomly* draw a point, as shown in the left triangle in Figure 2. Next, we roll a die to find the direction of the next point. In the triangle on the right, the roll of a die gave a 5 or a 6, which corresponds to vortex C. Then we apply the *global* rule and draw a point halfway to C (5,6). This algorithm is repeated again at each new point.

A computer was programmed to apply this rule 10,000 times. The first 50 points were discarded as "transients," and the remaining 9,950 points formed the black granular background inside the orderly fractal (Sierpinski)

triangle. The Chaos Game shows that local randomness and global determination can coexist to create an orderly, self-similar structure called a fractal (Peters 1994, 10–17).

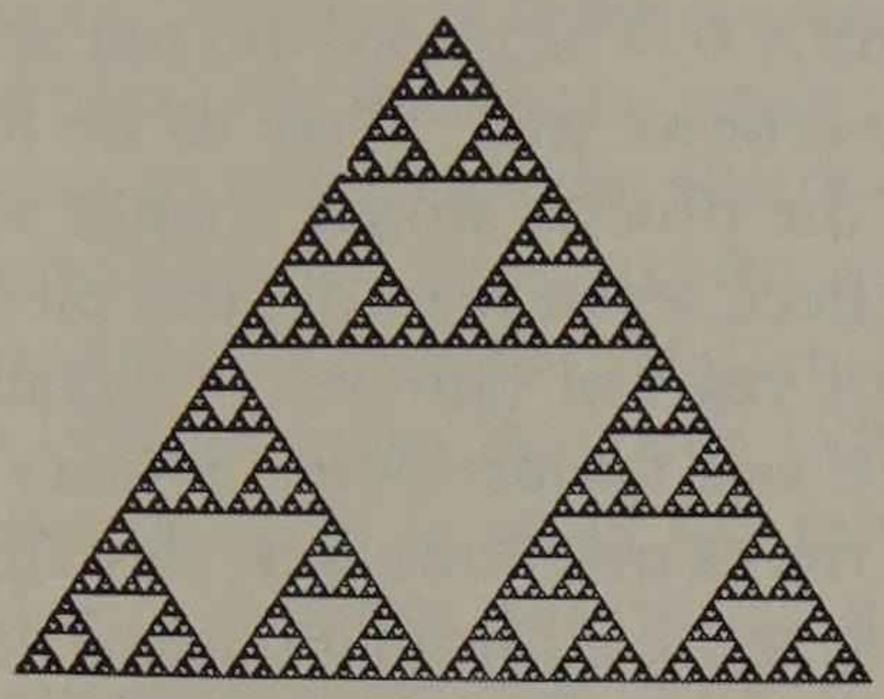

Fig. 1. A fractal (Sierpinski) triangle.

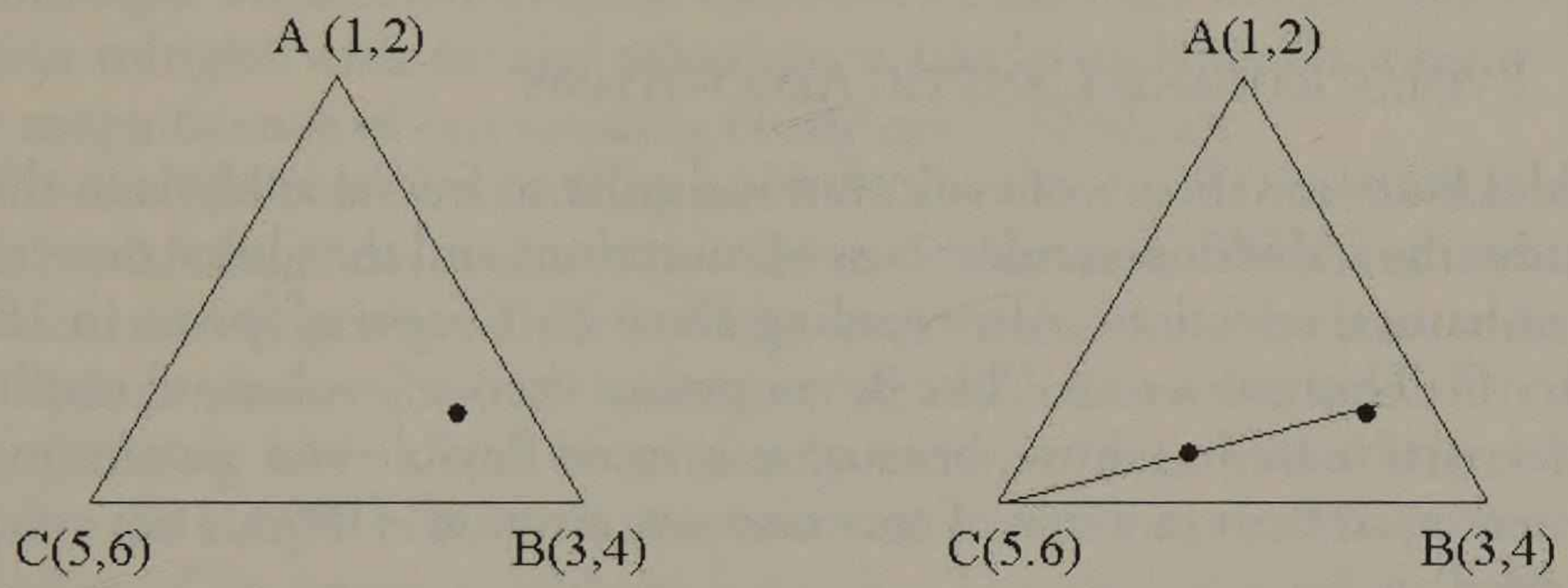

Fig. 2. Illustration of the Chaos Game.

The branching of the tubes in our lungs as well as that of plants is described by fractal scaling. For example, the diameter D(G) of our bronchial tubes is related to the diameter of our main trachea D(0) by

$$D(G) = D(0)\ 2 \exp(-G/3)$$

where *exp* means that 2 is raised to the fractional power -G/3. G represents the generation number 1, 2, 3, ... Each generation or set of smaller tubes is scaled down by this factor (Peters 1994, 13). Of course, not all of the smaller tubes are the same size, but they have a statistical distribution about the mean value given by the global equation above. Fractals have global determinism (average tube size) and local randomness (diameter of individual branches). The fractal structure is more stable and error-tolerant than the more deterministic, Euclidean geometry. This is why fractals are so common in nature from tree trunks and branches to the intricate vein structure of leaves.

The variations in natural phenomena such as the flooding of the Nile River, rainfall, tree rings, and noise-caused errors in electronic transmission lines also can be characterized by fractal statistics. H. E. Hurst (1900–

1978) worked on the Nile River Dam Project. Most hydrologists had assumed that water inflow was a random process. Hurst, however, studied the 847-year record that the Egyptians had kept of the Nile River's overflows, from 622 to 1469 A.D. The record did not appear random to Hurst. Larger-than-average overflows were likely to be followed by more large overflows. Suddenly, the process would change to a lower-than-average overflow (the Joseph Effect: seven years of great plenty in the land of Egypt were followed by seven years of famine). Overall there appeared to be cycles, but their length was nonperiodic. Hurst's mathematical analysis revealed that the Nile river's overflows were described by fractal statistics, which is more like picking a card from a stacked deck than from one that has been shuffled to be truly random. The stacking algorithm is the global rule that characterizes fractal statistics.

Evolution and Genetic Algorithms

Charles Darwin's theory of evolution is similar to fractal analysis in that it includes the individual randomness of mutations and the global determinism of natural selection. After reading Darwin's *Origin of Species* in 1859, Henry D. Thoreau wrote, "The development theory [evolution] implies a greater vital force in nature, because it is more flexible and accommodating, and equivalent to a sort of constant *new creation*" (1993, 102; emphasis added).

Darwinian evolution does not have design built in as a premise, but the design emerges as variations occur and some organisms get naturally selected over others (Ruse 2003). It is analogous to the algorithm for generating the fractal triangle, whose intricate design containing smaller triangles emerges as a result of applying randomness with the global law.

The engineering community has discovered that computer simulations of Darwin's evolution, called genetic algorithms, are very effective for optimizing physical devices. Edward Altshuler of the Air Force Research Laboratory discovered a genetic algorithm that enabled him to design antennas having much better performance than he would have been able to conceive of based on his many years of conventional design experience (Altshuler and Linden 1999). The genetic algorithm starts with millions of randomized antenna dimensions. Each antenna's performance is then calculated, and the best are selected as being closest to that desired. The next generation of antennas is made by "sexually mating" the best antennas: half the dimensions of each new generation are chosen from the old generation. These theoretical design predictions are in close agreement with experimental performance. Darwin's theory of evolution, discovered from nature, is very effective at optimizing the man-made world.

The development of a baby's neural system is a good example of natural selection. A baby has a number of neurons in parallel. The nerve that is

dominant and used is the one that survives. The other nerves atrophy and die—a good example of "Use it or lose it."

Biochemist Arthur Peacocke, winner of the 2001 Templeton Prize for Progress in Religion, states, "Instead of being daunted by the role of chance in genetic mutations as being the manifestation of irrationality in the universe, it would be more consistent with the observations to assert that the full gamut of the potentialities of living matter could be explored only through the agency of rapid and frequent randomization. This is possible at the level of DNA" (1998; see also Peacocke 1995). Chance operating within a lawlike framework is the basis of the inherent creativity of the natural order in its ability to generate new forms of matter and life. As in many games, the consequences of the fall of the dice depend on the rules of the game.

Biologist Stuart Kauffman of the Santa Fe Institute writes, "Self-organization mingles with natural selection in barely understood ways to yield the magnificence of our teeming biosphere" (2000, 2).

Steven Wolfram's best-selling book *A New Kind of Science* (2002) shows that randomness can evolve into order and vice versa. Wolfram uses a rule or recursion relation called "cellular automaton" to show that there are conditions under which a random set of cells can evolve into an ordered set. Starting with a row of randomly ordered black and white cells, he applies the simple cellular automaton rule that a lower cell becomes black if either of its upper neighbors is black. The row of random cells then evolves into an orderly pattern. Conversely, there are other local recursion rules, or cellular automatons, that cause an ordered set to evolve into a random pattern. Cellular automata can be used to generate the hexagonal patterns seen in snowflakes (Wolfram 2002, chap. 8) as well as pigmentation patterns in mollusk shells. The latter, like a one-dimensional cellar automaton, grow one line at a time, with new shell material being produced by a lip of soft tissue at the edge of the mollusk. The simple local rule of a cellular automaton can lead to the large-scale complexity observed in nature.

Does God Play Dice?

Einstein, having published a paper on random Brownian motion, would, I think, be fascinated by the discovery of fractal statistics if he were alive today. And Huston Smith might want to reconsider his doubt that God creates through the random mutations of evolution. He overlooked the global determinism of natural selection.

Does God play dice? Yes and no. Yes, if one considers the random nature of evolution and fractal statistics. No, if one considers their globally deterministic laws and rules. "God plays dice with the universe, but they're loaded dice" (Gleick 1987, 314). Like Hindu's Shiva, God plays.

Theological Reflections

The yes/no answer of this metaphor represents the polarity of randomness and law that characterizes the self-creating natural world. This polarity is in consonance with Taoism and contemporary theology. Theologian Paul Tillich believes that we have freedom only in polar interdependence with destiny and nature has spontaneity in polar interdependence with natural law. This interdependence is seen by theologian Gordon Kaufman (1993) as the serendipitous creativity of God. Continuing creativity is a common theme for multipolar process theology and such theologians as Philip Hefner and Pierre Teilhard de Chardin. Hefner believes that we are "created co-creators" (1993), and Teilhard holds that evolution is converging toward an Omega Point (1961, 287). Polarity is an intrinsic part of Taoism: good/evil, male/female, light/dark, and so on. Thus, Taoism would accept randomness and deterministic rules as complementing and balancing each other in creative tension.

Tillich believed that religious truth is expressed by symbol and metaphor, which should not be interpreted literally. Thus, "God plays dice, but the dice are loaded" should be understood as metaphor. Tillich emphasized that God is not *a* being, who would be finite and limited, but the ground of all being. Being is all-encompassing and includes both deterministic (law) as well as statistical (dice) reality. Evolution is a manifestation of New Being (Haught 2002). Tillich believed that God's creativity works though spontaneity of creatures and human freedom. This should *not* be understood as God's miraculous interference (Tillich 1963). Humans have freedom in polar interdependence with destiny, which are analogues of randomness (spontaneity) and law.

The polar interdependence between chance and law is seen by Kaufman as serendipitous (fortunate) creativity, which is manifest throughout the universe from the Big Bang on in trajectories. These directional movements emerge in the evolutionary development of the cosmos and of life (including human life) on planet Earth. Serendipitous creativity is a manifestation of God.

Mathematician Alfred North Whitehead's *Process Philosophy and Reality* (1929) is multipolar in that events occur as the joint product of the entity's past, including its genetic inheritance (law); its own action, self-creativity, and freedom (chance); and divine purpose. Creativity, the principle of novelty, is a universal of process theology. Our freedom eliminates a preordained determinism. God does not coerce but lures and guides the universe in the continuing process of evolution. God does not intervene in discrete events but is present in all events in a role different from natural causes. God "acts" with and through other entities rather than acting alone (Barbour 1997, 296). The Creator has a vision for the future rather than a deterministic plan (Haught 2000). God has both a primordial and a con-

sequent nature. In the latter, the creative process affects God. Divine purpose is a part of the evolutionary process.

We are created co-creators, according to Hefner (1993). God through the process of evolution created us with the freedom and responsibility to contribute to the ongoing process of creation. We are to "birth a future that is most wholesome for nature and the human community that birthed us" (1993, 27).

Global laws and randomness have analogues in Christianity. Global laws are similar to liturgy, such as the tradition of the Lord's Supper. The whisper of God's grace is beyond our ability to predict and thus has an element of surprise akin to serendipitous randomness. Grace is different from Hinduism's karma or cause and effect. "Grace is when God gives you something you do not deserve, in contrast to: Mercy in which God keeps you from getting what you deserve" (Hedrick 1986).[1]

Teilhard sees evolution occurring in the spiritual as well as the biological realm and converging toward the Omega Point, the final culmination of the continuing creation in God. The evolution of the earth from geosphere to hydrosphere, atmosphere, and biosphere is emerging toward a world-encircling "noosphere," created by human hearts and minds:

> The end of the world: the wholesale internal introversion upon itself of the noosphere, which has simultaneously reached the uttermost limit of its complexity and centrality. The end of the world: the overthrow of equilibrium (Heat Death), detaching the mind, fulfilled at last from its material matrix, so that it will henceforth rest with all its weight on God-Omega. (Teilhard 1961, 287)

Conclusion

Does God play dice? The yes/no insight from fractal geometry is symbolized in the self-similar patterns of the Sierpinski triangle, which can be generated with an algorithm that has both a random and a lawful element. Nature's spontaneity and our freedom result in a universe that has beauty and harmony. This self-creating universe with both randomness and law is for me a manifestation of divine creativity. Process theology reminds us that the universe is not static but an evolving and continuing creation, whose intricacies result in continuing scientific discoveries. I pray that we will have the wisdom to use the power of scientific knowledge as responsible created co-creators and not as destroyers of our earth through the unintended consequences of our technology. As created and creating creatures, we can profit from religious wisdom. In it, I find hope that the continuing creation is converging toward its ultimate consummation.

Notes

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1. Samuel Hedrick discovered this saying at Christ Church, Oxford, U.K., where John Wesley was educated.

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FAITH AND DOUBT IN SCIENCE AND RELIGION

by Varadaraja V. Raman

Abstract. One of the contexts in which religion and science come into conflict is with regard to faith and doubt. Generally speaking, we associate faith with religion, which is opposed to doubt, and doubt with science, which is opposed to faith. Some critics of science have argued that science is also based on faith; others have shown that there is doubt in the religious context also. In this essay I clarify these positions by defining different types of faith and different types of doubt.

Keywords: agnosticism; *gnosis*; intelligibility faith; quotidian doubt; quotidian faith; religious faith; *sciencis*; skeptic's doubt; verificatory doubt.

Among the contexts in which science and religion come into conflict is the area of faith and doubt. Faith is an essential ingredient of any religion, as doubt is of any scientific enterprise. Indeed, sometimes we use the word *faith* as a synonym for religion, as when we refer to a group of persons sharing the same religion as a "faith community." Likewise, a doubting tendency is sometimes described as "scientific attitude."

However, whereas most working scientists are not embarrassed about their skeptical attitude and may even speak with pride about it, religious thinkers tend to underplay the faith component in their religion, arguing that there are logical and rational modes by which faith can be justified. The avowed purpose of the respectable branch of theology called apologetics is to offer proofs and arguments for the doctrines and dogmas of a religion, either to combat opposing and dissenting theses or to persuade uncommitted souls to join a particular faith community. Many scientists, however, maintain that the strength of their enterprise arises from its insistence on doubt. They subscribe to Cicero's aphorism that it is by doubting

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that one arrives at the truth. Many commentators, both scientists and others, have noted that science is not dependent on faith for its survival and progress. Bertrand Russell declared that, unlike William James, who preached "the will to believe," he (Russell) himself would rather preach "the will to doubt" (Russell 1935, 135). The poet Robert Browning, in his poem "Easter Day," went so far as to say

'Tis well averred
A scientific faith's absurd.

In this essay I explore the shades of meaning in the words *faith* and *doubt* and their role and relevance in science and religion. Such a discussion may explain why different thoughtful writers often say conflicting things about the role of faith and doubt in the contexts of science and religion. It may also illuminate the confusion that sometimes arises in science-religion dialogues when the words are used indiscriminately.

Faith and Doubt

The words *faith* and *doubt* have been used somewhat indifferently in the context of science and religion. Thus, for example, Thomas Torrance states that "faith is correlated with the intrinsic rationality of the object and its self-evidencing reality and revealing power" (1980, 86). Because this is not unlike science offering justifications for its theories, some have argued that theology too may be regarded as a science. This idea is elaborated in Russell Stannard's interesting book (2000). It also has been said, "Religious belief is like science, and like much of the knowledge we gain from experience in the world or with other people, in that it involves postulating hidden forces whose source is not immediately apparent" (Hinde 1999, 34). This is not exactly Gould's nonoverlapping magisteria (NOMA), in which science and religion function in quite different ways (Gould 1999).

In one of his books, Bertrand Russell (1957) used the word *faith* consistently as "dogmatic belief" and also contrasted faith as a basis for a belief with the scientific mode, where evidence is the basis for belief. Robert Naumann, on the other hand, has categorically asserted that both science and religion "proceed from acts of faith" (1992, 71).

These are just some instances of how, depending on the connotation we give to the terms, we can claim that religion is based on blind faith or that science invokes faith no less than religion. Shifts in interpretation have also been occurring with the passage of time. There was a time when faith was relegated to religion and skepticism to science, which was believed to have freed itself from the constraints of faith.

In their commonly understood meanings, faith and doubt are regarded not as consciously adopted philosophies of knowledge but as states of conviction and experience of which the human mind is capable. These states

may have a genetic source, or they could be related to particular modes of neuron firings in different brains. Some persons are intrinsically inclined to one mode rather than to the other. The statement in the Bhagavad Gita (XVII:3) to the effect that "the faith of everyone is as per his nature" seems equivalent to the notion that faith is genetically determined. If this were the case, it would be futile to try to persuade people by instruction and argumentation to views contrary to those they currently hold. But this is not my concern in this essay.

Here I suggest three different shades of meaning to the words *faith* and *doubt* and argue that in religion one particular type of faith dominates and in science one particular type of doubt dominates.

Three Types of Faith

The first of seven meanings of the word *faith* given in Webster's Unabridged Dictionary is "unquestioning belief." The second of six meanings of the word *belief* is given as "faith, or a firm persuasion of the truths of a religion." Covering all of the connotations, faith may be looked upon as the implicit trust one places in a person, thing, or idea, often without asking for or requiring any proof of its validity. In this sense it is not quite true that the scientific enterprise does not rest on any faith. From this perspective, instead of the lines from Browning quoted above, we must rather say,

> It must be averred
> That a faithless science is absurd.

The thesis of the faith-free nature of science arises from ill-defined notions of faith. To clarify these, let us consider the following examples. When our mother tells us that a certain man is our biological father, we generally accept it as true. When we are young, we take our teachers' word for granted and trust that they have right knowledge of what they are teaching. We drink fruit juice and milk from cartons we buy at the store, trusting that no one has added cyanide to them. We board an airplane, usually without questioning the pilot's skill and sobriety.

It is impossible to go through life without accepting certain matters as true without getting first-hand confirmation of their correctness or veracity. We may describe this type of faith as quotidian faith, or *q-faith*. Q-faith is the unquestioning acceptance of a statement on the assumption that the probability of its being false is extremely small. Q-faith is not rationally or empirically fully justifiable, but the probability of its being correct is so high that we are willing to risk adopting it. Its truth content can be verified in principle by appropriate investigation. Without q-faith it would be impossible, in terms of time, to go through life. This idea is expressed in the New Testament thus: "We walk by faith, not by sight" (2 Corinthians 5:7 KJV).

Next, consider the following beliefs: The workings of every aspect of the world are, or will eventually be, intelligible to the human mind. That is to say, every phenomenon in the physical world can and will some day be explained fully in rational and coherent terms. There is order and harmony underlying the physical world.[1] Nothing happens all by itself; every observed event has a cause.[2] What has been observed to occur again and again an enormously large number of times will occur again; for example, one of the reasons we are so sure that the sun will rise tomorrow is that it has been doing so all our life.[3] The only right way to answer the question of the origin of the universe is "by the methods of science, by theory-aided observation and observation-governed theory" (Weinberg 2001, 54).

None of these statements can be proved on logical grounds to be unassailable. There is no obvious reason why the laws of physics that are currently observed to be operating in the world should have been the same ten billion years ago or in a galaxy three billion light-years away, or why the ultimate truth about the origin of the universe can be arrived at only by the methodology of science. Yet the scientific enterprise accepts these propositions as true. These propositions also fall under the category of faith. We may describe them as examples of intelligibility-faith, or *i-faith*. I-faith is at the very foundation of the scientific enterprise. It is adopted for at least three reasons: we cannot do any science without it, some of it seems most reasonable (intuitively true) even to an unprobing mind, and it has served the scientific quest extremely well thus far. However, if circumstances necessitated, the world of science would give up, however reluctantly, one or more elements in its faith foundation. For example, the notion of strict causality had to be modified, though not given up, as a result of the discovery of radioactivity.[4]

Now, consider the following beliefs: The Vedas have existed all through eternity. Moses received the Ten Commandments directly from Yahweh. Christ is the Son of God and came to save all humankind. Mohammed received God's message from the archangel Gabriel.

Implicit acceptance of the undemonstrated validity of these propositions is required of adherents of the corresponding religious traditions. Acceptance of a proposition on the basis of its scriptural authority constitutes religious faith, or *r-faith*. R-faith is not something we will readily abandon even if there are demonstrable indications that it might be invalid. It is embraced not because it conforms to what is generally regarded as common sense or because it is useful in understanding something but because it is a fundamental tenet of a religious system. The Old Testament passage "I know that my redeemer liveth, and that he shall stand at the latter day upon the earth" (Job 19:25 KJV) is an expression of r-faith, as is Nârada's declaration in the opening chapter of the first book of the Ramayana, "Whoever shall read the saga of Rama which purifies the mind, will be freed of all sins" (Raman 1998, 2).

Thus, r-faith is very different from q- and i- types of faith. Its roots are in revelation, cultural upbringing, and religious traditions. In some traditions it is believed that r-faith is given to a select few as a blessing. Biologists might trace it to particular genes. Whatever its cause or source, r-faith is often associated with the spiritual dimension of an individual. Some type of r-faith is essential for one to be a wholehearted member of any organized religion and to be committed to the spiritual quest. R-faith is the spontaneous, voluntary, and cheerful acceptance, arising from deep inner conviction, of something that one may or may not be able to prove on logical grounds. As Saint Gregory is said to have declared, "Faith has no merit where human reason supplies the proof" (Homilies, No. 40).

R-faith is an essential element in any religious context. Usually, but not always, r-faith refers to unquestioning belief in a transcendent principle, often called *God*. Even the so-called atheistic religion of Buddhism has bodhisattvas[5] who are said to have transcorporeal existence. Other important elements that give meaning and relevance to life are also associated with r-faith, such as hope for the future, the possibility of persistence after death, and the intrinsic value of goodness. Thus, r-faith is implicit belief in something that is not material, obvious, tangible, or easily recognizable. The statement that "the Gita can only be perfectly understood by devotees" (Prabhupada 1972, 439) is an expression of r-faith. In the Bible we read that "faith is the substance of things hoped for, the evidence of things not seen" (Hebrews 11:1 KJV).

In the scientific realm, *seeing* refers to recognizing the convincing data we get through sensory faculties and through reason. In religions, it means recognizing meaningful and fulfilling truths through intuition and deep conviction. Thus, it has been observed that there is this important distinction between science and religion: In science, we believe what we see, whereas in religion we see what we believe in. As Saint Augustine asked rhetorically, "What is faith if not believing in what thou seest not?" (Saint Augustine 40.8, in Pusey 1965)

Countless people have benefited from and been enriched by r-faith. People with r-faith are fulfilled in their spiritual longing and religious commitment, whether they be churchgoing Christians, Makka-going Muslims, bhajan-singing Hindus, or followers of other traditions. According to Harold Koenig, "Systematic research indicated that in some parts of the United States, 90 percent of persons with serious medical illness use religion at least to some degree as a coping resource, and approximately 50 percent of those persons report that religious faith is the most important factor that enables them to cope (i.e., it is more important than family, friends, work, or any other known coping resources)" (Stannard 2000, 107). This is true also in many other parts of the world.

In the following statements from the scriptures of three major religious traditions, r-faith is meant: "But those who with faith, holding me as their

supreme aim, follow this immortal wisdom, those devotees are exceedingly dear to me" (Bhagavad Gita XII:20). "Be thou faithful unto death, and I will give three a crown of life" (Revelation 2:10). "Those who believe and work righteousness, their Lord will guide them because of their Faith. Beneath them will flow rivers in Gardens of Bliss" (Qur'an 10.9).

Some may wonder how faith, which serves religion well, happens to be inappropriate in science. When Robert Ingersoll declared that "investigation is better than unthinking faith," what he had in mind was r-faith, not i-faith. It is not always recognized that the r-faith of religion has little to do with i-faith and hence with science.

When we fail to make the distinction between the nuances of faith, arguments and impasses are bound to arise. Then we will have difficulty differentiating between fundamental science and metaphysical theology. Referring to some of the challenging problems of modern cosmology, John Barrow says categorically, "If our methods fail, then any boundary between fundamental science and metaphysical theology will become increasingly difficult to draw. Sight must give way to faith" (Barrow 1990, 373). It is not clear that in the context of a puzzled science r-faith is really helpful for scientists. If anything, in such a context science should reconsider aspects of the i-faith on which it rests and functions.

Doubt

Doubt is a state of mind, some would say an affliction of the mind. It is a condition in which one is unable or unwilling to accept a given statement as true on the face of it. When we say we are in doubt, what we mean is that we are not altogether certain about the truth or correctness of a proposition, the reliability of a person, the existence of something, and so forth.

Like the word *faith*, *doubt* is used in a variety of contexts with varying shades of meaning, resulting in some avoidable misunderstandings between science and religion. Controversies tend to arise when one ignores the variety of doubts that might arise in the mind. To clarify this I refer, as I did with faith, to three different situations where doubt could arise.

First, consider a salesperson who extols a product that he or she is eager to sell. We may not be inclined to accept everything that the person says. Or, if a doctor tells a close relative of a seriously ill patient that there is a good chance of recovery, the relative might have some doubts about what the physician says. And when a very probable suspect, when questioned by the police, asserts that he or she is innocent, the police may not accept the statement as absolutely true. These are instances of what may be called quotidian doubt, or *q-doubt*. In q-doubt there is reason to suspect that the proponent of a proposition is not telling the truth. Usually the individual has an ulterior motive for this. The opposite of q-doubt is not faith but rather credulity or gullibility.

Next, consider a preacher who proclaims that those who commit sins are bound to suffer one way or another, in this world or in the hereafter, or an expert in economics who says that if certain steps are taken certain economic problems will be solved. And consider the assurance that one will attain salvation if one accepts Jesus Christ as Savior, or Mohammed as the only Prophet, or an equivalent proposition in another religion. In these instances, too, one may doubt that the proposition is 100 percent reliable. The doubt arising in these cases is very different from q-doubts, however. Here, those who make the claim are honest and sincere in what they say. They have no intention to cheat, fool, or take advantage of others. Doubt arises in these cases not because one distrusts the credibility or integrity of the source but rather because the proposition in question strikes the doubter as somewhat improbable. This type of doubt may be called the skeptic's doubt, or *s-doubt*. S-doubt is not necessarily associated with disregard or lack of respect for the source or with suspicion of dishonesty.

The New Testament passage "He that doubteth is damned" (Romans 14:23) is referring to s-doubt. When it is declared that there is no doubt in the Qur'an (32.2) it is implied that one should not approach it with s-doubt. When the Bhagavad Gita says that for the doubting person there is happiness neither here nor in the next world (IV:40), it is again of s-doubt that Krishna speaks.

S-doubt is the antithesis of r-faith and is not religion-friendly. Thinkers have recognized this since ancient times. Thus, the poet Tennyson reminded us in his "In Memoriam" (Gray 2003, 2) that sowing doubts in times of prayer would spoil the richness of the experience:

> Leave thou thy sister, when she prays
> Her early heaven, her happy views;
> Nor thou with shadowed hint confuse
> A life that leads melodious days.

Now, let us say that certain chemists announce that they have produced nuclear fusion reactions at ordinary temperatures. Upon reading this report, the general public may be impressed and excited, but scientists who know something about nuclear fusion, and especially those who are working in the field, will have serious doubts about the correctness of the report or the claim of the chemists. They will immediately set to work to reproduce the reported result. Or suppose that an astronomer claims to have spotted a comet or a new galaxy at such and such a celestial location. Other astronomers will direct their instruments toward the reported coordinates to see if it is so. This gesture, from a truth-content point of view, is also an expression of doubt about what one has been told.

Finally, take the case of a student performing an experiment in a physics laboratory to verify a certain law of physics that was enunciated in a lecture. Why should the student do the experiment? Does she not trust the

professor or the textbook? The point is that a student learning the methodology and techniques of science must not, in principle, trust (accept unquestioningly as true) whatever the teacher says. The act of doing an experiment in a science course is a scientific ritual in which the student implicitly says "Yes, what my teacher told us in class may be right, but unless I do the experiment myself and verify it, I really cannot accept its validity."

These are all examples of what may be called verificatory doubt, or *v-doubt*. A v-doubt arises not by distrust in the integrity of the source (q-doubt) or even necessarily from the implausibility of what is stated (s-doubt) but from two other considerations:

1. Scientific results need to be validated by individuals beyond and away from the first source through independent observations and repeated verifications. This has nothing to do with the unreliability or untrustworthiness of the source. In fact, when a reported result is not pursued by others to verify or modify it, this is an insult to the scientist who first presented it to the community.

2. No matter how reliable the scientific authority may be who proposes or tries to propagate a scientific proposition, unless the claim is tested independently by many different people using all the available resources, it is not regarded as scientifically valid. Thus, v-doubt is a necessary component of the scientific enterprise; it is an important element in scientific methodology, just as r-faith is a necessary ingredient of religion.

Just as it is simplistic to say that there is no faith component in science, it is not true that there is no doubt component in the religious context. Many deeply religious people experience s-doubt when they encounter a religious system other than their own. Indeed, the rejection of the doctrines of a different religion is an emphatic expression of s-doubt. Thomas Aquinas did this explicitly with respect to Islam in his *Summa contra gentiles* (1956). Likewise, a religious person may have some s-doubt with respect to certain doctrines in his or her own religion. Indeed, this is the starting point of any new religious sect. Buddhism and Protestantism, the Arian heresy in Christianity, and the Shiite-Sunni sectarianism in Islam—all these and other sectarian movements within religions resulted from the s-doubts of religious thinkers.

Even devout believers sometimes experience s-doubt. "Doubting Thomas," Saint Paul, Saint Augustine, and C. S. Lewis from the Christian tradition and Vivekananda from the Hindu tradition all entertained serious s-doubts before becoming profoundly religious. Though some religious people have held that r-faith whose validity is logically demonstrated is not true religious faith, others, especially religious thinkers who have been touched by science, tend to argue that, at least at some stage, s-doubt is a necessary precondition for faith. Thus, Michael Corey says that "God might actually prefer the critical-thinking agnostic, who eventually comes

to Him through a hard-won battle of conflicting beliefs, to the mindless subservient 'believer' who hasn't even bothered to examine his or her belief structure" (Corey 1993, 289). One may wonder how this author and others seem to know about God's preferences, but the point is that honest s-doubt is not incompatible with religious seeking.

Contextual Relevance of Faith and Doubt

The value in distinguishing different types of faith and doubt lies not only in clarifying these important mental states but also in recognizing that both doubt and faith are indispensable in science and in religion and are relevant in different contexts. Thus, for example, singing a devotional hymn in church is a great thing to do, but doing it in a physics colloquium would be inappropriate if not laughable. Telling a joke may be appreciated at a party but not during a funeral service. No matter how fulfilling it may be to an individual, r-faith will not be helpful in the formulation or elaboration of a technical theory in science or mathematics, and doubting the sanctity of scripture becomes inappropriate if not offensive during the performance of a sacrament or religious ritual.

Generally speaking, q-faith and q-doubt come into play in personal attitudes, decisions, and actions. They are generally irrelevant in the public (science) domain. That is to say, they come to the fore in our attitudes and behavior toward others, in interacting with people we know, when we are buying things, and so forth. Sometimes, however, q-faith also arises in the minds of scientists when they attempt to perfect a theory they are developing. For example, Albert Einstein and others spent many years trying to formulate a unified theory of gravitation and electromagnetism, goaded by the conviction that the two must be different manifestations of one and the same deeper reality. This conviction is an instance of q-faith. No element of i-faith is violated if there are two, rather than one, fundamental forces governing the universe. Contrary to the normal undertaking in science, which is to try to explain an observed phenomenon, attempts at unifying the two fields is an intellectual struggle to formulate a theory that has no immediate observational basis whatever. This i-faith–based effort did not bear any fruit. On the other hand, the hypothesis of wave-particle duality, proposed by Louis de Broglie on the basis of his q-faith in symmetry in nature, turned out to be successful.[6]

Similarly, an observational quest to detect an aspect of nature that is predicted by a scientific theory is often inspired by v-faith in the theory. This may or may not lead to success.[7]

Failure to see the difference between i-faith and r-faith leads to statements like "Whereas religions normally make a clear statement on their articles of faith, science introduces its assumptions more surreptitiously" (Wallace 1996, 12). Contrary to what is implied here, science does not try

to sneak anywhere surreptitiously. It simply marches on, with its triumphs and errors, letting the rest of the world benefit from and be enriched by its fruits or discard its worldviews, inviting all but compelling no one to accept its findings.

Religiously inclined scientists—and there are many—do not like to compartmentalize their scientific and religious dimensions. They wish to be religious and scientific in every aspect of their life and to live a fully integrated life. This is a valid position to take and is perhaps the only meaningful way of being religious as well as scientific. However, it is important to be clear about what one means by an integrated life. For most of us it is difficult to bring our faculty for v-doubt into the presence of a sacred altar during a religious service and equally hard to bring in our r-faith while doing a scientific experiment or elaborating a scientific theory. As long as it is recognized that v-doubt and r-faith are reserved for different categories of experience, it is possible to ignore or set aside one mental state while being engaged in another. This is neither disloyalty to science nor disrespect for religion. It is important to take the contexts into account appropriately. To be religious and scientific does not mean that we have to bring into action both v-doubt and r-faith in all contexts, much less simultaneously.

The Scientist's Faith and Traditional Faith

This recognition resolves what seems like a paradox to some: that profound and creative scientific minds can also be profoundly religious. Johannes Kepler and Isaac Newton were mystically religious, Galileo Galilei and Augustin Cauchy were deeply Catholic, James Clerk Maxwell and Michael Faraday were personally religious, and Srinivasa Ramanujan and Chandrasekhara Raman were traditionally religious, to name only a few. There are many other instances of great scientists acknowledging the existence of some supreme principle undergirding the world (Frankenberger [1969] 1973). Steven Weinberg explains this by saying that "religious skepticism is not a prejudice that governed science from the beginning, but a lesson that has been learned through centuries of experience in the study of nature" (Weinberg 2001, 26–27). But the idea that scientists have finally awakened to the truth as against the clouded visions of their ancestors does not explain why Einstein, Max Planck, Werner Heisenberg, and John Polkinghorne still were (are) among the faithful.

The paradox is cleared up if we distinguish between different types of faith. I-faith is indispensable for the practice of science, while r-faith is quite unnecessary for science. At the same time, r-faith is also quite neutral in its impact in the context of scientific research. The oft-quoted faith of scientists (Vukanovic 1995) is quite different from r-faith. For many, though certainly not all, scientific thinkers the existence of a superior intelligence puppeteering the phenomenal world is a persuasive possibility.

They are led to this on the basis of their global vision of a universe governed by precise and inexorable laws. However, this is very different from r-faith in the sense of an unquestioning acceptance of God or God's messenger(s) with specific historical attributes such as traditional religions proclaim.

Indeed, unlike scientists of past centuries, most modern scientists, when they speak as scientists about God, refer to the divine in generic terms rather than with a name that is particular to a religion. It is important to distinguish this transdenominational, nonanthropomorphic, mathematically sophisticated entity from the r-faith of traditional religions.

It is equally important to distinguish between science as an enterprise and religion as an experience and to recognize that i-faith goads us to further research, whereas r-faith gives us inner peace. Every scientist who works hard on a theory has full i-faith in its correctness even if it is as yet only partially established, but this faith is very different from a committed Christian's faith in Christ as Savior or a devout Hindu's faith in Vishnu or in the law of karma.

Gnosis and Sciencis

The term *gnosticism* encompasses certain worldviews and practices in the ancient Christian world. Its pre-Christian roots had such components as mysticism and esoteric practices. It was built on the conviction that by these means the human soul could pierce through the intervening opaque walls between us and the realm of the divine and ultimately reach the heavenly world beyond.

The word is derived from the Greek for knowledge, *gnosis*. The Greek word for knowledge led to r-faith–based knowledge, whereas the Latin word for knowledge, *scientia*, gave us the word *science*, which seeks v-doubt–based knowledge, namely, science, which is an entirely different kind of knowledge. Both claim to have acquired knowledge.

One of the tenets of gnosticism is that it embodies higher knowledge, which has come down to the practitioners from God. Moreover, this knowledge is to be accepted without proof or demand for proof. This knowledge is about God and the divine realm, about transcendence, and about the esoteric origin of the world, according to which the world is the result of some corruption of the divine. Gnosticism is about ways of finding our way back to where we came from and about the ultimate dissolution of the world.[8]

Though the word and practice of gnosticism in the technical sense are no longer as widespread as they once were, the underlying gnostic view of an unfathomable mystic undercurrent, the concept of higher knowledge, and an indescribable transcendence are still very much in the framework of discourse, implicitly or explicitly, often in transformed language and modes, in all r-faith–based systems.

I have coined the word *sciencis* to refer to knowledge gained through the mode, methodology, and framework of (modern) science as an enterprise. It may be said, then, that science-religion dialogues are exchanges between *sciencis* and *gnosis*.

Believers and Nonbelievers

At one level of the religion-science dialogue, skeptics try to analyze why many millions believe in a God and in the religion of their family, community, or ancestors. They have come up with various theories to explain this. Some attribute r-faith in God to fear of death or awe about the hereafter, others to a continuation of the childhood need for a father figure. Yet others look upon it as a vestige of the herd mentality already present in the pre-*Homo sapiens* stage. Some suspect that it results from genetic coding, and others see it as an evolutionary adaptation phenomenon.

Conversely, religionists have analyzed the mindset of unbelievers. They have their own explanations as to what they see as the plight of those who are blind to the magic of divinity and stone deaf to the call of the Almighty. Some of their explanations include the following: The deluded unbelievers have succumbed to the temptation of the devil or have fallen under the spell of an evil spirit; the unfortunate nonbelievers have not yet received the grace of God; the inability to sing God's glories is a consequence of evil deeds perpetrated in past lives.

Both groups discount the facts that many positive things have arisen in human history from the r-faith of believers as well as from the v-doubt of nonbelievers, that there have been great scientists and thinkers who have been men and women of deep r-faith, and that many horrible acts in human history have been committed in the name of r-faith.

There is a famous statement by Thomas Huxley to the effect that irrationally held truths may be more harmful than reasoned errors. Huxley's affirmation does not always hold. That we will go to Heaven if we serve the poor, the sick, and the helpless is an irrationally held truth. But it has done no harm. At one time, indeed during Huxley's own era, it seemed reasonable to many to proclaim that certain races were inferior to others and needed to be subdued for their own benefit. Very much harm was done as a result.

It does not seem to occur to either group that they share one thing: Both are convinced that their own understanding of whatever may or may not lie beyond the world of perceived reality is the right one.

Agnosticism

I digressed into gnosticism because that was the origin of the word *agnosticism*. Although the majority of people accept without much thought or questioning the assertions of traditional religious texts and preachers re-

garding the transcendental reality, quite a few have doubted its existence. In other words, many have had s-doubts about some of the details in the r-faith of religions, but they have either not pursued the matter or simply accepted it all so as not to rock the boat.

However, all through the ages and in all societies, some have wondered aloud about the contents of r-faith. They reject outright all the religious narratives about the distant past and religious prognostications about what is to come in the very distant future and about God, angels, and the like. More in realization of the limits of the human intellect than in frustration or antagonism, some of them say that they really don't know about these matters. These are the agnostics. Huxley coined this term. In his own words, "I took thought and invented what I conceived to be the appropriate title of 'agnostic.' It came into my head as suggestively antithetic to the 'Gnostic' of Church history who professed to know so much about the very things of which I am ignorant, and I took the earliest opportunity of parading it to our society, to show that I, too, had a tail like the other foxes. . . ."[9]

Huxley's agnosticism incorporates an element of v-doubt, for he said, "In matters of the intellect, follow your reason as far as it will take you, without regard to any consideration. . . . Do not pretend that conclusions are certain which are not demonstrated or demonstrable" (in Bibby 1967, 19).

For millennia keen minds with admirable qualities have been enunciating very divergent theses as to the nature of God and the hereafter and arguing their respective contentions intelligently and voluminously. Their followers have been so convinced of the correctness of the views of the masters that they have often engaged in mutual verbal and sometimes even physical abuse. Corporal punishment for wrongdoing, however unpleasant, may sometimes be understandable. But burning fellow beings at the stake, cutting off their heads, or maiming their bodies because they had different notions of what constitutes God and afterlife arises from mindsets that one would hope are things of the buried past.[10] In this context, to say "I'm afraid I don't know" seems more modest and reasonable and less prone to provoke vehement attacks.

Like the words *faith* and *doubt*, *agnosticism* has also been often misunderstood. It may be rejected because it hesitates to affirm a reality beyond the concrete world of appearance (commonsense reality) in which we normally function. Some have argued that agnosticism leads to meaninglessness because it adamantly refuses to attach long-range significance to anything, to hopelessness because it confesses that one is totally lost as to what life is all about, and to atheism because it says, directly or indirectly, that there is not sufficient evidence for us to believe in the existence of God. This view is succinctly expressed by Enrico Cantore: "Science leads to agnosticism, and agnosticism breeds desperation" (1977, 172).

It has been argued also that agnosticism can lead to paralysis of action, meaning perhaps that if we are not sure of Heaven and Hell, of a punishing or a rewarding God, we cannot choose between moral options. I do not see why uncertainty about the afterworld should necessarily lead to naughty behavior, or why honesty, decency, truthfulness, and other such virtues should necessarily be linked to or hinge upon receiving a bonus sooner or later.

Agnosticism arises from at least two factors. First is the conviction that ultimate questions are interesting to speculate about but impossible to answer unequivocally. These questions relate to the nature of God, the relevance of humans, slime, and slugs in the larger cosmic scheme, the long-range meaning of life, love, and laughter, and the possibilities of personal experiences after death. That it is difficult to formulate unshakable views of such matters does not mean that we cannot or should not work within frameworks that can be meaningful and uplifting, just as the fact that marital love at times slips and leads to divorce does not mean that people should never get married.

Second, agnosticism is an inability to be persuaded by answers to fundamental matters relating to origins and to distant futures, especially those relating to consciousness, such as are offered by traditional religions and by keen and insightful philosophers. This inability could arise because those answers lack rigorous logical support or because of our own limited capacity for accepting proclaimed truths, even if they are backed by time-honored prophets who are revered as messengers of God.[11]

It must be emphasized that there are myriad moral, humanitarian, political, and other issues on which agnostics can and do speak with at least as much intelligence, and act with at least as much impact and compassion, as those who are sure about the elusive and complex issues pertaining to the Supreme and the hereafter.

An agnostic does not say "You are wrong" but rather "I don't know for sure, and probably you don't, either." Agnostics are less likely to impose on others their lack of answers than true believers would be to impose their own answers. An agnostic might be amused while a true believer would probably be upset by those who hold different views.

Agnosticism is not a call to refrain from making any assertion about any subject, or a reluctance to take a stand on any issue, that results in standstill or indifference on matters of import. Rather, it is the expression of humility in the face of very difficult and apparently intractable questions. It is the enlightened recognition of ultimate mysteries.

Concluding Thoughts

Doubt and faith have many nuances, both when they serve as guides for meaningful action and when they are taken as frameworks for understanding the world of experience. The facile generalizations that science derives

all its richness from its inherently doubting nature and that religion becomes narrow because of its anchor to faith need to be revised to gain a fuller appreciation of both science and religion. Science and religion are not so much nonoverlapping magisteria as parallel magisteria in that each magisterium, relying on particular modes of doubt and faith, enriches the human condition in its own way as *sciencis* and *gnosis*.

Notes

1. For example, according to Hans Reichenbach (1957, 292), Einstein's inspiration for his theory of relativity came from his conviction of "the harmony of the universe."
2. Max Planck regarded causality as a signpost "which helps us find our bearings in a bewildering maze of occurrences, and indicates the direction in which scientific research must advance in order to arrive at fruitful results" (quoted in Nash 1963, 196).
3. David Hume's critique of this is well known.
4. It is accepted that the radioactive decay of a particular nucleon cannot be described as arising from a specific cause. Rather, it is the random consequence of a statistical law.
5. In the Buddhist Jatakas one reads about bodhisattvas, who, according to Mahayana Buddhism, are various personages on the path to the higher awakening. In various forms and with various names, often with local color, they are worshiped in China, Tibet, Japan, and other countries with Buddhist adherents.
6. De Broglie reflected on Planck's hypothesis of the dual nature (particle-wave) of radiation energy and Einstein's matter-energy equivalence and concluded from symmetry considerations that matter should have a similar wave-particle duality.
7. Thus, the search for the neutrino and the omega-minus particle bore fruit, but that for the tachyon did (has) not. In each of these cases, the experimentalists had full faith in the correctness of the corresponding theories: energy conservation in the neutrino, the eightfold-way theory in the case of the omega-minus particle, and relativistic consistency in the case of tachyons.
8. It may be mentioned here that in the Hindu framework there is a very similar distinction between what are called *para* (higher knowledge) and *apara* (lower knowledge). The former is transrational and is acquired only through spiritual modes, whereas the latter is rational, logic-based knowledge. We read in the Manduka Upanishad (1.1.4), "Two kinds of knowledge are to be known, as the knowers of Brahman say: the higher and the lower."
9. This appears in an article on agnosticism in the journal *Nineteenth Century*, February 1881.
10. The eradication of this mindset is among the goals of the Enlightenment which has been attacked by some postmodern thinkers.
11. Things are not made easier for the agnostic when it is noted that there are significant differences of opinion among the prophets of the religions to whom ultimate truths are said to have been revealed.

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Reviews

Science, Life and Christian Belief: A Survey of Contemporary Issues. By Malcolm Jeeves and R. J. Berry. Grand Rapids, Mich.: Baker Books, 1998. 305 pages. $19.99 (paper).

Everyone who participates in the science-and-religion conversation has some conceptual scheme for understanding science, religion, and their interaction. Most such schemes are relatively straightforward, and often it is possible to predict someone's stance toward science by knowing their stance on, say, the Bible. We are all familiar, for example, with creationists who reject much of mainstream science because it disagrees with the Bible; we know other theologians who reject anything in the Bible that disagrees with science. Both of these "camps" are large and well-defined in some predictable ways and the issues that divide them quite clear. But some of the more interesting players are those who join the respective concerns of science and religion in novel and unexpected ways. I am thinking of such anomalies as atheist chemist Hubert Yockey, who is allied with conservative evangelicals like Phillip Johnson in rejecting certain aspects of evolutionary theory; or theologians in the Barthian tradition who can't find anything relevant to religion in contemporary science; or Richard Dawkins, whose atheism gathers strong support from science; or Hugh Ross, for whom each new scientific discovery provides yet another apologetic argument for Christian faith; or Stephen Jay Gould, strangely allied with the Barthians in his belief that science and religion are unrelated and best understood as "non-overlapping magisteria." The roster on the masthead of this journal, in fact, contains an interesting assortment of thinkers, some of whom share very little beyond the belief that the conversation between science and religion is important or at least very interesting.

Authors Malcolm Jeeves and R. J. Berry have just such an idiosyncratic synthesis of science and religion, combining a full acceptance of both contemporary science and a conservative evangelicalism, understood from a Reformed perspective. Jeeves and Berry have long been important contributors to the science-and-religion conversation and are now both semiretired after decades of productive work in science. Jeeves has had an illustrious career in neuropsychology at the University of St. Andrews in Scotland, where he is now "honorary research professor." He also is the president of the Royal Society of Edinburgh. Berry has retired from a distinguished professorship in genetics at University College, London, and remains active in genetics research. Both publish regularly in science and religion and are on the editorial board of the British Journal *Science and Christian Belief*. They write from the perspective of "working scientists" (p. 11) and are fully aware of just how their religious beliefs interact (and, perhaps more important, do not interact) with their scientific work. *Science and Christian Belief*

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is an extensively revised and updated version of Jeeves's *The Scientific Enterprise and Christian Faith* (London: Tyndale, 1969), which grew out of a conference in which a broad range of participants came together to discuss issues arising at the interface of science and religion.

Jeeves's earlier book was broadly based and was widely used as one of the first texts in the embryonic period of what has been steadily evolving into the "discipline" of science-and-religion. The authors, together with such people as Ian Barbour, Donald MacKay, and Colin Russell, are thus in that small group of "pre-Socratics" who laid the foundations for this new field. The need for this more recent book is the continued shortage of science-and-religion texts that do not "restrict themselves" (p. 11) in some way—such as those by John Polkinghorne that do not deal in much detail with issues arising from the life sciences—or are written by "historians or philosophers of science" (p. 12) rather than scientists. These concerns, I think, are legitimate. To cover the bases in my science-and-religion course, for example, I rely on a number of texts—John Hedley Brooke's now-standard *Science and Religion,* Jerome Langford's classic *Galileo, Science, and the Church*, and a couple of anthologies. Even so, my students regularly visit the library to consult reserves.

The organization of the book approximates the form of an "Introduction to Science and Religion" course, starting with some general remarks about the origins of science, followed by a discussion of the nature of science, moving on to specific areas like cosmology, evolution, and psychology, and finishing with a look at contemporary problems needing attention. Such an ambitious survey runs the risk of a certain unevenness—mitigated in this case by the dual authorship—which is the reason why the majority of texts in this field are anthologies, which rely on a cross section of scholars, each contributing a particular expertise.

Consistent with this approach, the authors begin with a brief survey of "Hebrew-Christian and Greek influences on the rise of modern science." The confluence of these two cultural streams is understood to have catalyzed the scientific revolution in the way that has been described by scholars like Reijer Hooykas and Russell. The authors, clearly located within what H. Flores Cohen has called "The Great Tradition" (*The Scientific Revolution: A Historiographical Inquiry* [Chicago: Univ. of Chicago Press, 1994]), describe the science of the Middle Ages as "ossified" and (over)emphasize the revolutionary character of the developments from Copernicus through Newton. Using Jeeves and Berry's own terminology, Cohen critiques the Great Tradition as due, in part, to "*working scientists*' virtually inborn prejudices regarding the achievements of their predecessors" (p. 39; emphasis added). While such oversimplifications are perhaps unavoidable in a book like this, the authors should at least have acknowledged that recent work in this area, such as David Lindberg's *The Beginnings of Western Science* (Chicago: Univ. of Chicago Press., 1993), has certainly nuanced, if not called into question, the Great Tradition. Lindberg's important volume is not even included in the authors' lengthy bibliography of several hundred works.

The authors then turn to the question of the nature of scientific laws and their relationship to God. Both the "craftsman" (p. 36) and "creative artist" (p. 37) models for God are rejected as too far removed from the God of the Bible, whom they understand to be "sovereign" (p. 34), "outside the creaturely time scale" (p. 39), and who "may do miracles from time to time" (p. 47). The authors under-

stand miracles in the traditional sense as events "outside the laws of nature," but they take natural law to be "weaker than a law of logic" (p. 46) so that God can act in the world without contradiction. Polkinghorne is cited in support of their position (pp. 45–46) but I do not think he would be entirely comfortable with their uncritical acceptance of the biblical miracle stories. However, Polkinghorne's intuitions about the character of natural law come from physics, whereas the authors' come from biology, and there is no good reason to privilege one of those perspectives over the other. The laws of physics, in fact, tend to resemble "laws of logic" much more than their biological counterparts do.

In the discussion of the scientific method, the authors' perspective of "working scientists" begins to enliven their presentation. They critique "over-formalized" (p. 51) presentations of the nature of science and point out, in a way that I found very helpful, that such caricatured misunderstandings of actual science result from philosophers' tendency to use "scientific papers and books rather than the working notes" of practicing scientists (p. 51) as their primary sources. Specifically rejected are the accounts of the positivists, the models of Karl Popper and Thomas Kuhn, and contemporary constructionists like Andrew Pickering. Imre Lakatos (strangely absent from the index) is quoted with approval: "The history of science is always richer than its rational reconstruction" (p. 54). The authors, in concert with virtually all of their colleagues in science, are realists, methodological naturalists, and see science as having a "self-imposed silence" (p. 67) on religious questions. They also believe that the "Christian worldview positively encourages involvement in the scientific enterprise" (p. 69) while warning that certain "world pictures" (pp. 62–65) emerging from science are antithetical to the Christian faith.

Most apparent conflicts between science and religion are readily resolved by recognizing that explanations, whether scientific or theological, can be on entirely different logical levels, a topic that occupies most of chapter 4. An analysis of a mouse learning a maze is provided to illustrate this point. The steadily growing competency of the mouse can be studied from the perspective of learning theory, of electrical activity in the mouse's brain, or biochemical changes in the mouse. Scientists pursuing investigations along these lines would certainly not perceive their differing explanations to be in competition; they would understand that their explanations were at different logical levels and thus were best understood as complementary.

The authors next move into a discussion of some specific areas of science—cosmology, biological evolution, psychology. In each case mainstream scientific ideas are accepted, and familiar connections to religion are made—the anthropic principle à la Paul Davies, models for God's action in the world à la Polkinghorne, mind-body analogies à la MacKay, and so on. While avoiding aggressive criticism of scientific creationism, the authors make it clear that that particular understanding of origins is neither biblically nor scientifically plausible. Many individual Bible verses are invoked to support their view.

The most detailed section of the book relates to human nature, one aspect of the science-religion conversation to which the authors, particularly Jeeves, have made important contributions. (See Jeeves's *Mind Fields: Reflections on the Science of the Mind and Brain* [Grand Rapids: Baker, 1994]). Consistent with recent scholarship in a number of areas, they argue that a proper understanding of both

science and the Bible leads to a rejection of any sort of dualism that attempts to "divorce the mind from the physical" (p. 100). Here, as elsewhere, they rely heavily on the Bible for their religious understanding, with only occasional reference to the long theological conversation on this topic. Convinced that there is a single consistent biblical view, they exegete some problematical texts and critique some wayward interpretations, such as the belief that the scriptures speak of an "intermediate state" (pp. 149–52) between our present and resurrected existences. The tone throughout is congenial, however, and the authors acknowledge that, in the final analysis, what they are dealing with is "ultimately a mystery" (p. 152).

I found the authors' scientific discussion of the mind-brain link—an area of science missing from my training in atomic physics—very informative, although I must confess to a certain unease when the discussion made use of concepts like "neurofibrillary tangles," "granulovascular deterioration," and "nigrostriatal pathways" (p. 175) without clarifying those frightening polysyllabic terms. The authors suggest that the mind/brain, while not itself a dual entity, nevertheless is best studied using a dualistic approach—top-down in the manner of psychology and bottom-up in the manner of biology. Here again we find the authors arguing for a multilevel approach that does not privilege a reductionist approach to such problems.

The last scientific topic in the book is an excellent discussion of environmental issues that the authors believe have been ignored because of the distracting debate over creation and evolution. Consistent with the generally conservative approach of the book, they are critical of "green" religion (p. 225), "green" science (p. 229), the Gaia hypothesis, and any theological models that make the universe a part of God, such as pantheism or panentheism.

Science, Life and Christian Belief concludes with a criticism of the high priests of scientific materialism—Peter Atkins, Francis Crick, and Richard Dawkins—followed by some suggestions for how science and Christianity should get along. The authors suggest that this relationship should be based on three insights: (1) "We live in a world which is in principle understandable" (p. 248); (2) "God has revealed himself to us" in the Bible (p. 248); (3) "We live in God's world, and we are his stewards" (p. 249). "Our need," concludes the book, "is not more science, better reason or great faith; it is faith in a great God" (p. 254).

Science and Christian Belief is unapologetically apologetic for an orthodox, conservative Christianity understood from a Reformed perspective. Traditional perspectives are defended throughout: miracles, the virgin birth, the Fall. The authors consistently reject any models for God, such as panentheism, that compromise either God's sovereignty or the creator/creation distinction.

The authors also are clear on the primacy of scripture, which they "fully accept" as the "revelation of God" (p. 12). The approach to Genesis is somewhat concordist, affirming a historical fall while acknowledging that the historical sciences have established that "Adam and Eve could not be the physical ancestors to the whole human race" (p. 111). They employ the rhetorical style characteristic of conservative evangelicals, always referring to what the "Bible" says, rather than quoting individual authors of scripture, as is characteristic of more liberal scholars who understand the Bible as a collection of writings with a complex and varied authorship and not a unified revelation of God.

Science and Christian Belief is also unapologetically apologetic for an orthodox, traditional view of science, from the perspective of productive researchers with

decades of experience working in the life sciences. All of the established ideas of contemporary science are fully embraced, including evolution and the Big Bang. Darwin's work is described as a "brilliant attempt to synthesize a mass of previously unordered evidence" (58), and young-Earth creationism is dismissed as a "minority view" that results from a misguided "biblical interpretation" (p. 90). Even the intelligent-design movement is anonymously critiqued in a surefooted discussion of the character of scientific explanations which "become satisfying to a scientist only when they can be shown to be derivable from theories" and "not simply to be able to explain isolated phenomena" (p. 72). The book is replete with seminal insights such as this recognition of the nature of a "satisfying" explanation—insights that come, no doubt, from the authors' personal experience in the actual development of scientific explanations, as distinguished from "armchair" discussions of scientific explanation that look to philosophy or theology for guidance.

Jeeves and Berry's simultaneous affirmation of a conservative evangelical theology and mainstream science is both refreshing and unusual and probably communicates something interesting about the difference between British and American evangelicals. The overwhelming majority of American evangelicals, who would share the authors' "high" view of scripture, are most certainly going to be put off by the wholesale acceptance of evolution and the Big Bang. Such readers also will be surprised to find the authors insistent that a doctrinaire "pro-life" position on abortion is neither scientifically nor biblically plausible and creates a number of "problems at the ethical interface" (p. 168), a position sure to alienate conservatives. On the other hand, readers from mainline religious traditions, who resonate with the "high" view of science, will be surprised at the authors' summary rejection of panentheism, versions of which animate the theology of many of the contributors to this journal. "As Christian theology it [panentheism] is seriously defective because it relegates Christ's death to that of a mere catalyst within history, and empties it of all eternal significance" (p. 220). Chastened panentheists can, however, draw some comfort from the fact that the authors' harshest criticism is reserved for those who would argue that Christianity has an ethic of environmental exploitation.

But all readers should pay close attention to the authors' suggestion that the majority of conflicts can be avoided by allowing simultaneous explanations at different logical levels.

Does *Science and Christian Belief* work as a survey text? Probably not, unless it is supplemented with recent work in the history of science, where it is outdated, and some alternative theological perspectives, where it is narrow. But it does provide a helpful survey of a number of topics and an excellent introduction to the mind/body problem from both a scientific and a religious perspective.

There is one very large audience that I hope will read this book: the millions of American evangelicals who are convinced that a traditional conservative understanding of the Christian faith cannot be reconciled with a full acceptance of contemporary science, especially evolutionary theory. Precious few books address this issue, but this fine volume by Jeeves and Berry does.

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A Scientific Theology. Volume 1: Nature. By Alister E. McGrath. Grand Rapids, Mich.: William B. Eerdmans Publishing Co., and Edinburgh: T & T Clark Ltd., 2001. xx + 325 pages. $40.00.

Alister McGrath titles the first volume in his trilogy with a word he quite dislikes: *nature*. Here is a postmodern evangelical, deconstructing everybody else and discovering the objectivity of his own Christian view: that "nature" so-called is really God's "creation." The latter word would have been a more accurate title than the much-dismissed "nature."

McGrath is bright; this is a learned survey of historical ideas of creation and nature, as becomes an Oxford professor of historical theology. I envy his knowledge of the forming and reforming of ideas over many centuries. I am rather more sympathetic with "nature" but not unsympathetic with a version of his general project. I do something of the same thing myself. In fact, everyone who thinks his or her views are true has to argue away the myriad conflicting views as some kind of error.

Here is the argument in sum:

> The present analysis will develop the argument that the concept of "nature" is a socially mediated notion, not an objective entity in its own right. Unless the potentially meaningless or conceptually fluid notion of "nature" is given an ontological foundation through the more rigorous Christian doctrine of creation, the continued appeal to "nature" is without intellectual justification or merit. The Christian doctrine of creation is perhaps the only viable means by which the notion of "nature" may be salvaged, and placed on a sustainable intellectual foundation. Without an ontological foundation, "nature" is simply one person's construction and projection, and what is "natural" a restatement of that person's own moral vision, which has been read into—and not out of—an ethically and philosophically amorphous world. (p. 87)

So McGrath is enthusiastic about what the social constructionists have revealed, exposing how the environmentalists have their agenda, whether conservationists, preservationists, or ecofeminists, and how the resource users, economists, and developers have theirs. "The concept of 'nature' is a serious candidate for the most socially conditioned of all human concepts" (p. 88). "One does not 'observe' nature; one constructs it" (p. 113). In "the book of nature" too "there is nothing outside the text" (pp. 110–21). The facts of science are theory-laden; all seeing is "seeing as" (Norwood R. Hanson, *Patterns of Discovery* [Cambridge: Cambridge Univ. Press, 1961]).).

Different cultures have their different concepts of nature. The term is fluid, vague, plastic, and unstable. In the West especially, McGrath likes C. S. Lewis's remark that nature is a term "we" (Western men) use to describe what we have mastered, and hence concepts of nature as a machine or feminine (pp. 105–10). "Yellowstone Park [a social construction] is not allowed to manage itself; it is managed by well-intentioned human beings" (p. 114, citing Alston Chase). Similarly with the American idea(l) of "wilderness," defined as a place absent humans (p. 83). (Never mind that Lewis's definition does not fit the environmentalists very well). Somehow even the Atlantic Ocean is constructed now that we fly over it in airplanes (pp. 114–15).

But wait; the natural sciences cannot be deconstructed so easily; they are a "serious headache" (pp. 121–24) for the postmodernists. So now, although those who speak of "nature" or "wilderness" are merely using constructs interpreting nature, the physicists and biologists are not; they are discovering what is really there. The natural sciences, McGrath could have noticed, do a good deal of constructing to help with their observing (constructing radio telescopes or relativity theory).

Even here McGrath is cautious: these physicists and biologists have a tendency to become "naturalists," who think that nature both exists and is all there is; and if so they are constructing nature again. "In the end, naturalism is a *blik*" (p. 132), another socially constructed filter controlling the interpretation of all evidence and arguing away any possible counterevidence.

Nature is whatever we see it as, unless and until we see it to be what it really is: God's creation. Yes, that too is an interpretive category, a "pair of spectacles" with which to look at the world (p. 137). We will then desperately need some account of why everybody else has only a projection, while Christians alone see correctly.

McGrath's answer, beyond his appeal to revealed truth, includes the claim that the natural scientists also do see what is really there in the world: goodness, rationality, and orderedness, illustrated in the "unreasonable" (= marvelous) effectiveness and beauty of mathematics (pp. 209–14, 218–24, 232–40). There are "laws of nature" that are "universal, absolute, eternal, omnipotent" (pp. 225–32). "Simple laws govern almost all succession of events" (p. 220). A physical world of this kind known by a cognitive mind of the human kind is not self-explanatory but is a signature of God. With this "*logocentric* conception of creation" (p. 156), humans are imaging God, thinking God's thoughts after him.

McGrath does think creation exists, and with its autonomy. "The explanatory autonomy of the created order is itself a consequence of its creation by God" (p. 171). Well, if so, then maybe to call that domain "nature" generically is not such a bad idea. Maybe some observers can see that autonomous order and integrity even if they do not see the "metaphysical fingerprints" (p. 172) that identify the Maker. Put a little differently, McGrath's main claim is rather similar to that of Richard Fern in his *Nature, God and Humanity* (Cambridge Univ. Press, 2002), but Fern welcomes rather than dismisses the insights of secular thinkers who discover values in nature. Only he goes on also to argue that the biblical roots of these discoveries are unacknowledged and that without these roots the valued tree of life will not stand.

Tracing the intellectual history of an idea such as natural theology or evolution by natural selection and showing that there were connections with other social forces—dislike of ecclesiastical pomp led some to favor a simpler theology of nature; Darwinism fed into social Darwinism—does not ipso facto prove that the developing idea is a social construction, primarily explained as "shaped by the social agenda" (p. 248). McGrath knows this and at times can back off. "The position adopted in this study is not that the concept 'nature' is totally socially or culturally constructed, but that the notion is partly shaped by socially mediated factors" (p. 133). With the latter claim no one will disagree; all the disagreement will turn on how much and where. Despite momentary caveats, McGrath's push is toward non-Christian "nature" as nothing but social construction. "The more fundamental difficulty is that the concept of 'nature' lacks the epistemic autonomy

required to permit it to be, or become, a theological resource in its own right. As we have stressed throughout this work, 'nature' is itself a construct rather than something which can act as the foundation for an ideational construction" (p. 257). The autonomy is withdrawn.

I would prefer to evaluate proposals about the nature of nature as the generating and testing of hypotheses, to be tested by all parties to the debate as much for their descriptive plausibility as mediated by social forces. A concept found in both theology and biology is "genesis," denied by none, but this bridge between nature and creation is not crossed here. "Earth" is another overlooked transept concept, but is Earth as constructed as nature is?

Whether McGrath likes it or not, there is an enormous body of knowledge about nature (the forces and processes generating and sustaining the environing world)—astronomical, geological, meteorological, and biological sciences that are autonomous from any legitimating biblical or theological oversight. Such science is not to be explained as mostly social construction, as he recognizes. These are "publicly accessible resources" (p. 300). This is, indeed, the line that McGrath promises to take in volume 2, *Reality*. Metaphysicians, theologians included, must look to this phenomenal world; and science is far more revealing about the detail of this than theology is. Nor, despite the theological claim that humans are epistemically fallen (pp. 286–94), is there any particular reason to worry that the sciences constructed by these scientists (astronomers, geologists, meteorologists, biologists) are epistemically corrupted by the fact that these scientists are also sinners.

Is there a natural theology? Yes—in the end; mostly no en route. "A natural theology, which sees nature as a creation, has an important role in a scientific theology" (p. 294). That is where we are headed, but most of those who have attempted a natural theology have to be dismissed before we can arrive at this conclusion. Now it seems that the Christians have wandered around in search of "natural theology" as much as have the philosophers and naturalists in search of "nature."

McGrath legitimates natural theology as a subdiscipline within his revealed (and "scientific") theology (p. 282), though why this should not rather be called "theology of creation" is obscure. Its place is not to prove that God exists but to reinforce the plausibility of an already existing faith (p. 267). The "neutral observer" (p. 284) cannot find any knowledge of God by studying nature. "It is only when the theologian has deconstructed nature—that is to say, identified the ideological constraints which have shaped the manner in which 'nature' is conceived—and recovered a Christian construal of the natural order that a proper 'natural theology' may be restored" (pp. 285–86). Everybody else has "constructed" an ideology, but Christians have a construal which sees the truth.

Of course skeptics will reply that one could just as plausibly say that Christians are biased by faith, and this looks equally like construction. Karl Barth denies natural theology when confronting the Nazis, and this looks as socially constructed as any other idea in the book (pp. 267–72).

There will not be any natural theology unless the Bible licenses it, and the Bible, which is without the word "nature," has only a weak natural theology; those who know Yahweh from the Torah can also find further glory of God in awe of creation (p. 259). McGrath minimizes the classical biblical passages that seem

to permit the Gentiles to have some knowledge of nature or nature's God (Paul on Mars' Hill adapted his rhetoric to his audience).

The concepts of chaos and disorder are discussed, revealingly, in a discussion of sin. McGrath wonders "whether the disordering to be discerned within the natural world . . . can be regarded as reflecting or resting upon a concept of sin." There is "emergent disorder within a primordially ordered cosmos." Following T. F. Torrance, McGrath holds that "the universe has fallen into disorder . . . and thus requires 'redemption from disorder'. . . . Sin affects the very fabric of creation. . . . The extent of this disordering is such that divine transformation of the cosmos is required to realign it with the divine intentions and goals—a transformation which is brought about through the death and resurrection of Jesus Christ, by which the 'reordering of creation' may be initiated" (pp. 289–90). "Redemption must be understood to embrace the whole created order, which has now fallen into disorder, and not simply humanity" (p. 176).

Two ideas here are not kept apart as well as they might be. One is that nature itself has fallen, which has some connection with sin. The other is that humans have fallen, and sin distorts their cognitive capacities when viewing nature. If nature has ontologically fallen, we would like to know when this took place, since on the evolutionary scale humans appear late, and the fundamental processes of nature—life and death, speciation, extinction, genetic coding, predation, ecosystemic food chains—do not seem to have altered with the arrival of immoral humans. There is no serious support in any science for a nature ontologically corrupted by any connection with human sin. The astronomical, geological, meteorological, evolutionary, and ecological processes are what they are and were so for millennia before humans appeared on the planet.

McGrath was once a biologist; we are reminded of his Oxford Ph.D. in molecular biophysics, and he cites his work in the field. Given that previous incarnation, for a "scientific theology" there is surprisingly little engagement with biology. One would never know that the human genome was being sequenced while this book was being written. "Gene" and "genetics" do not appear in the index; nor does "evolution," or "adapted fit." No reader could guess the main contentions either within biology or in the dialogue with theologians. The sociobiologists challenging religion with their selfish genes, such as Richard Dawkins and E. O. Wilson, are barely mentioned (pp. 252, 304); Elliot Sober and David Sloan Wilson defending the evolution of altruism are not here at all. Stuart Kauffman, John Bonner, and Christian de Duve exploring how nature is self-organizing—not here. John Maynard Smith, the best of theoretical biologists, on the origins of increasing order; Stephen Jay Gould, the most outspoken paleontologist, on the sheer contingency of evolution; Francisco Ayala, distinguished geneticist active in the biology/religion exchange—not here. Michael Ruse? Only in a footnote or two, in passing (pp. 31, 132). Ian Barbour, dean of the science-religion dialogue? Dismissed in a few paragraphs (pp. 38–39, 71).

McGrath celebrates the rationality of the physical world with its universal and absolute laws of nature. He does not address, indeed he does not seem to know, the widespread observation that in biology there are no laws of nature, only locally earthbound generalizations. Order mixes with disorder. Biology is not elegant—so Frances Crick has complained. What is one to say of messy phenomena such as the catastrophic extinctions? or of the balanced polymorphism that trades

off protection against malaria at the price of liability to sickle-cell anemia? The theodicy in Mark Wynn's *God and Goodness* (Routledge, 1999) takes suffering in creation far more seriously.

Reading McGrath, one would not know that one of the surprising developments in biology over the last quarter century has been the intense advocacy by biologists for conservation in the midst of a biodiversity crisis. The natural scientists have been as ready to be nonanthropocentric as the Christian theologians have; the Society for Conservation Biology has been better at this than has the World Council of Churches.

Despite my misgivings, I found McGrath stimulating and insightful. "There is a fundamental resonance—but nothing more—between nature and theology, with the latter offering a prism through which the former may be viewed and understood" (p. 295). Yes, nature is not finally self-explanatory or "self-authenticating" (p. 295). Christians do have a prism that diffracts, analyzes, and enlightens what scientists and naturalists discover. But theology that is not diffracted by their discoveries is unenlightening about nature.

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Faith, Science and Understanding. By John Polkinghorne. New Haven and London: Yale Univ. Press, 2002. 224 pages. $19.95 ($12.95 paper).

In the Preface, John Polkinghorne describes this book as a "further thoughts" volume, looking again at some of the issues raised in four of his more recent books. It consists of nine relatively short chapters; two of these are further subdivided, so that there are fifteen separate pieces in all. The close link with his earlier work is illustrated by the fact that there are more than sixty references in the footnotes to earlier writings of his own. The nature of those links is not uniform. Some of the pieces are based on talks given, sometimes to a fairly general audience, and take the form of a broad presentation of some major aspect of his thought. Others were written specifically for this volume and take up particular points that he feels need further development or clarification.

In reviewing a book made up of so many short pieces of a somewhat diverse nature, it is impossible to comment on each one. That is a relief for me, since several of the shorter ones are concerned with the precise way in which recent scientific ideas are best to be understood, on which I as a theologian am not competent to speak. (Indeed other theologians with more scientific competence than I have might also hesitate to do so, seeing how sharply Wolfhart Pannenberg is taken to task for his use [or misuse] of scientific concepts.) But Polkinghorne was, as he acknowledges, trained primarily as a scientist, so there is a prima facie likelihood that it may be on the theological side of his interdisciplinary investigations that questions need particularly to be asked. I discuss just three issues that figure prominently in this collection and that seem to me to call for further consideration.

1. Polkinghorne emphasizes the need for a "natural theology" which shows how the understanding of the world to which modern scientific study has given rise leaves scope for, and even invites, other forms of reflection of a theological kind. I find his general handling of this familiar but important topic helpful and convincing. The basic character of his position is neatly summed up in his observation that a Grand Unified Theory is not the same as a Theory of Everything. More detailed aspects of his arguments, such as whether he is right to relate the openness of the physical world to quantum theory, chaos theory, and complexity theory rather than to Einstein's conception of the finite but unbounded nature of the universe (against Torrance, p. 175), and the openness of history to the ideas of the top-down effects of active information rather than to field theory (against Pannenberg, p. 167), I leave to others to judge. But the nature of the discussion is further to be commended for the modesty of its claims. The evidence does not prove the rightness of a theological account; it only allows it as a reasonable possibility. Nor does it favor a Christian theology over against other religious interpretations of the world (pp. 49–51, 65). His treatment of the question of Christianity's relation to other religions is brief but sensitive. What is surprising is that it seems to have no impact on his understanding of Christian theology.

2. A second major theme in these writings is the nature of theological study as compared with the study of science. Polkinghorne describes himself as a "bottom-up" scientific thinker, working in a characteristically English empirical tradition and with an understanding of the physical world best described by the term *critical realism*. Theology, he believes, should follow a similar method, though one must expect some differences arising from the differences between the subject matter of the two disciplines. I would endorse this as a general statement of method, but it still leaves a lot of room for disagreement about the nature and the extent of the differences entailed by the differences of subject matter. And on that score I find myself parting company with him.

The Bible, as he understands it, is not a divinely dictated textbook but "*evidence*, the record of foundational spiritual experience, the laboratory notebooks of gifted observers of God's way with men and women" (p. 37). Theologians need to wrestle with this evidence in ways comparable (but not always identical) to the ways in which scientists wrestle with theirs. One example of his own readiness to do so in a fully critical manner is his description of the prose sections of the Book of Job as not using "the language of responsible theological discourse at all" but operating with the "concept of a disturbingly 'tricksy' God." They cannot, he concludes, be as "authoritatively revelatory" as the poetic sections of the book (p. 63). So when elsewhere (p. 58) he speaks of "revelation as evidence" we have to remind ourselves that this is a loose way of speaking, since we have first to judge which parts of the evidence in our laboratory notebooks are revelatory and to what extent.

Here, he suggests, the creeds (which are compared to the data tables of the particle physicists, though unlike them not subject to change) may help us. They are not "non-negotiable formulae presented for us to sign without hesitation or question" but are summaries of the early church's reflection on scripture staking out the "territory in which a faithful theology is free to roam" (pp. 38–40). One of the results of the differences between the two disciplines' subject matter, he

argues, is that theology is not a cumulative discipline like science, which "conquers intellectual territory it will not have to give up." And the reason this is so is because theology's "Subject transcends human observers; the transpersonal reality of God is not open to our manipulation or putting to the test" (p. 39). That there are differences between the way theologians and scientists test their theories and that those differences are for the kind of reason he affirms, I fully agree. But I question whether he has identified those differences aright. The theologian's evidence is, as Polkinghorne himself recognizes, not the transcendent God but "the record of foundational spiritual experience," and that human record is always and inevitably affected by the understanding of the world at the time. So changing understandings of the world make theologians read their basic evidence differently. They may, for example, come to judge the creeds to be a less satisfactory summary of scripture than they have been judged to be in the past. "The autonomy of theological thinking within its own proper domain," which Polkinghorne cites with approval from Torrance (p. 179), is at risk of losing sight of the historical, earthbound character of its foundational evidence. And that can lead to a failure to follow out sufficiently rigorously the kind of critical evaluation of theological evidence that Polkinghorne's own underlying theological method calls for, and so to fight shy of the kind of theological revision toward which it naturally points.

3. The third major issue is a particular instantiation of those more general methodological considerations—namely, divine action in what is generally called "special providence." Polkinghorne is well aware that divine actions of this kind are not easily explicable in relation to the physical world as science understands it, but he is equally convinced that they are integral to Christian belief. Such difficulties, however, are not absolute. "The cloudy unpredictabilities of created process," as we are beginning to understand them, allow for specific divine agency to be "exercised as a cause among causes," without overruling the acts of creatures (p. 127). More than one feature of the current understanding of the physical world might be understood to provide the occasion for such a form of divine action; his own preference is for what he styles principles of "active information" (p. 148). He admits that this is highly speculative but is content to be able to show that the idea of such particular divine actions is not incompatible with modern scientific knowledge.

Not being a scientist, I am not competent to assess the plausibility of such speculations. Polkinghorne himself points out the shortcomings of earlier attempts by William Pollard and others to use quantum theory in a similar way to account for divine action at the macroscopic level (p. 120), and I would have liked more explanation as to how the causality he proposes could serve to explain the kind of instances of special providence he has in mind. What I miss even more, as a theologian, is any discussion as to whether the traditional affirmation of special providences initiated by specific divine actions might call for reconsideration. For a bottom-up thinker committed to critical evaluation of the basic biblical evidence, this would seem to be an issue in need of reflection. Divine speaking, for example, is a common feature of the biblical record; yet most Christians give it a far from literal interpretation. Ought not the possibility that something similar might be appropriate for the notion of specific divine actions merit more than a simple dismissal as a sign of theological impotence (p. 146)?

There is a further problem about the apologetic value of this speculative account of how divine action might responsibly be seen as "a cause among causes" in the physical world. Polkinghorne admits that, in addition to affirming divine action in cases of special providence that might otherwise be treated as examples of serendipity, he is committed, in view of the centrality of the resurrection, to the affirmation of miracle (pp. 43, 59, 128, 190–91). He does not give any detail here of his understanding of the resurrection, but from his earlier writings it is clear that, while not regarding it as a straightforward case of resuscitation, he does see it as involving among other things the disappearance of the physical body from the tomb. A miracle of that kind can hardly be accounted for by the means that he proposes for divine actions in general; nor does he suggest that it can. What he emphasizes here (and in his earlier writings) is that miracle stories are to be assessed and their "*theological* credibility" (p. 191) affirmed by the degree to which they are consistent with our broader understanding of God's purposes. That is a fully appropriate stress for determining the theological and spiritual value of a miracle story. But the fact that the resurrection is an anticipation of the Christian's eschatological hope does nothing by itself to help us see how it is to be integrated into our understanding of the physical world—the quest that he pursues so unrelentingly in the case of special providence. Nor does Polkinghorne's suggestion that there may be an analogy with the way scientific investigation of unexpected and puzzling physical phenomena sometimes requires explanations that cannot immediately be related to already familiar phenomena strike me as very convincing (p. 59). So, whatever be the truth of his speculative suggestions about special providence, there is still a crucial gap in his attempted account of divine action as a whole.

Polkinghorne's project of integrating our understanding of science and theology has many strengths and has made a valuable contribution to a better approach to the topic. But even with the fine tuning attempted in this volume, it still has some major difficulties. My conclusion is that he needs to give greater weight to the "critical" part of his critical-realist approach to theology than he is inclined to do. As with changes of scientific paradigms, what at first seems like a repudiation of past ideas and is strongly resisted as such may turn out in the long run to have a much more positive relation to earlier views than was at first apparent. It would be surprising if a critical-realist approach to understanding the transcendent God should not prove to be a very faltering one, in need of frequent revision.

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Physics and Metaphysics: Theories of Space and Time. By Jennifer Trusted. London and New York: Routledge, 1991. xii + 210 pages. $114.95.

Jennifer Trusted introduces the book's theme in a preface by asking "What is metaphysics?" According to Aristotle, she explains, metaphysics describes that which is beyond the scope of physics, such as presuppositions that cannot be established by scientific inquiry. She then states her intention to show that presuppositions, speculative conjectures, and even mystical beliefs are nevertheless important—in fact essential—to natural science.

While the early chapters describe the influence of the Christian religion, later sections emphasize the importance of philosophical developments on the emergence of science in Europe. Trusted shares her conviction that the influence of Christianity on science even today should not be underestimated: "There is more to the relation between religious faith and scientific inquiry than the apparently contingent fact that many scientists have been motivated by their religion and that some Christian clergy have been scientists. Certain fundamental tenets of Christian doctrine support presuppositions that have been, and still are, of prime importance for science" (p. xi). She provides several interesting examples.

The first chapter, "The Ordered Cosmos," begins with a discussion of the tenets of medieval Christian Scholasticism. Scholastics demanded teleological explanations of physical events—that is, ultimate explanations in terms of divine purposes. Knowledge about the natural world was to be obtained through study of the scriptures and "authorities" only. The second chapter, "Old Beliefs and New Ideas," describes the eventual rejection of this tradition in the course of the historic struggle between proponents of Ptolemy's geocentric cosmology and Copernicus's heliocentric system. Chapter 3, "Chaos," details the turmoil that resulted from Galileo's conflict with the Roman Catholic Church. While the Bible continued to be regarded as an infallible source of knowledge, the role of the church as its sole interpreter was no longer unquestioned. The author notes the importance of Galileo's introduction of careful observation and experimentation and Kepler's description of natural phenomena in terms of mathematical laws.

Chapters 4 and 5, "The Search for a New Order" and "The Grand Design," deal with the influence of Descartes and Newton, who agreed with Galileo that the book of nature would be in accord with scripture assuming that both are properly interpreted. But, according to Descartes, humankind should not seek the impossible, namely, the discovery of God's purposes. Teleological explanations hence were abandoned and causal laws of nature accepted as ultimate explanations. The universe became a machine that functioned according to physical laws—with one exception: the human soul. This Cartesian dualism led to a fundamental dichotomy between science and religion.

Concerning epistemology, the rationalists Descartes, Leibniz, and Spinoza believed that knowledge of nature could be obtained by reasoning alone. The British empirical tradition, by contrast, held that sense experience was essential for such knowledge. Because sense experiences are limited and fallible, however, Locke admitted that natural philosophy could not yield indubitable truth. At any rate, the pretense of basing knowledge of nature on divine revelation ended, and human reason and observation became the sources of human knowledge.

At the close of the seventeenth century, through the discovery of the laws of motion and universal gravitation and the great successes of celestial mechanics, order had come out of chaos. Philosophers still accepted God as the original cause of all motion but disagreed on God's present activity in the world. Leibniz concurred with Francis Bacon, who stated, "God worketh nothing in nature" (*Advancement of Learning* [1605], Book I), while Newton firmly believed that God's omnipresence and eternity implied God's immanence and occasional direct interventions in space and time.

Chapter 6, "The Age of Reason," states that in the opinion of eighteenth-century British natural philosophers the cosmic order and laws of nature reflected divine harmony and constituted proof of the existence of God. Reason hence replaced revelation, and natural theology flourished. But whereas the idea of a divine Creator was accepted, the new philosophy had no place for God's "providence" or "salvation." Deism superseded Christianity. As explanations of events were sought in terms of purely physical laws, natural philosophy became associated with materialism. French philosophers denied the existence of an immaterial spirit and declared that the human being is a machine. The earlier latent secularism became explicit and the exclusion of God from scientific explanation total. This marked the start of the conflict between science and religion.

The eighteenth century also witnessed challenges to the power of human reason, in particular Hume's skepticism about the reliability of empirical knowledge. Immanuel Kant conceded that we cannot know ultimate reality and suggested that "instead of all our knowledge conforming to objects, let us suppose that all objects conform to our knowledge" (*Critique of Pure Reason*, ed. and trans. N. Kemp-Smith [London: Macmillan, 1929], 22).

Chapter 7, "The Age of Experience," discusses the emergence of science from natural philosophy at the end of the eighteenth century. The rationalist criterion of knowledge—logical certainty—had been rejected, but confidence remained that sense perception could be truly objective and independent of theory. The positivism of Comte in France and Spencer in England turned into a philosophy which promised that all knowledge was attainable through scientific inquiry.

In Chapter 8 the author tackles the problem of "Energy and Aether." For Descartes the aether was a logical necessity—the medium required for the propagation of light waves through space. Newton, convinced of the corpuscular nature of light, considered it an empirical hypothesis. Maxwell's identification of light as an electromagnetic wave led to the general acceptance of the luminiferous aether. Chapter 9 discusses the subsequent "Revolution" in physics at the beginning of the twentieth century as physicists such as Michelson and Morley failed in their attempts to detect the aether. The author traces the story of the rejection of the concepts of absolute space and time and briefly introduces Einstein's special relativity theory. The space-time concept and the dependence of an observer's measurements on his frame of reference are explored.

In the final chapter, "Physics and Metaphysics," Trusted returns to her stated goal: "to show that metaphysics plays an essential role in empirical inquiry." She focuses on the remarkable changes in Einstein's own views of science. The theoretician Einstein started out as a positivist but later came to appreciate the importance of imaginative conjectures. In conclusion, the author mentions Hawking's book *A Brief History of Time* and his apparent need to repeatedly appeal to a

power that transcends human capacities in order to account for the existence of the universe.

To summarize, *Physics and Metaphysics* focuses on the history of the developments of the concept of inertial motion, Newtonian mechanics, the conservation laws of energy and momentum, some elements of electromagnetism, and special relativity theory. Einstein's theory of general relativity, however, is essentially omitted, and in that sense the book's subtitle, *Theories of Space and Time*, is somewhat misleading. Even more significant are the omission of quantum physics and of recent discoveries such as chaos theory, together with their philosophical and theological implications. Critiques of the traditional scientific method by, for instance, Kuhn and postmodern thinkers also are missing. Perhaps such topics could be included in a future edition of this otherwise well-balanced work.

The book's nontechnical nature (no mathematical formulae appear in the text) should make it accessible to a wide audience. At the same time, readers must be cautioned that this volume cannot be considered an introduction to, say, the elements of special relativity theory. Some prior study of physics is helpful for a fuller understanding. The book provides concise end-of-chapter summaries that students will find very helpful as an overview and reference frame for discussion.

In the opinion of this reviewer, Trusted has succeeded in showing that the basic metaphysical assumptions of Aristotle, of Scholasticism, and of classical and modern science are still with us today. The author's careful documentation of the rich interaction between science and religion over several centuries is particularly valuable. I warmly recommend this book. It should be of particular interest to students and teachers of science. It is unfortunate that, at present, the education of most scientists does not include sufficient opportunities for the study of the history and philosophy of their subject matter. Trusted's book—which also seems entirely appropriate reading for an undergraduate course on the relation of science and religion—could contribute much to a better understanding of the metaphysical underpinnings of natural science by the practitioners of science and, hence, to a more sophisticated discussion of the role of science in society today.

Jennifer Trusted is the author of several books on the philosophy of science, including *The Logic of Scientific Inference: An Introduction* (London: Macmillan, 1979) and *Beliefs and Biology: Theories of Life and Living* (London: Palgrave Macmillan, 2003).

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Controlling Our Destinies: Historical, Philosophical, Ethical, and Theological Perspectives on the Human Genome Project. Edited by Phillip R. Sloan. Notre Dame, Ind.: Univ. of Notre Dame Press, 2000. 535 pages. $50.00 ($20.00 paper).

Publication of this multi-authored volume on humanistic implications of the Human Genome Project (HGP) in the same year as the announcement of virtual completion of the project was especially timely. The anthology of essays contains a wealth of information and ideas valuable to scholars, teachers, and laypersons

wishing to participate constructively in the dialogue about appropriate societal responses to the new powers with which our species is being endowed.

Phillip Sloan is Director of the J. Reilly Center for Science, Technology and Values at Notre Dame, which along with the Department of Energy ELSI (Ethical, Legal, and Social Implications of the HGP) Program sponsored a 1995 conference at the University of Notre Dame for discussing humanistic implications of the HGP. This book is the published version of that conference. Sloan has provided an introductory article and edited twenty other contributions, fifteen essays and five accompanying commentaries, by twenty-three authors. The book has four parts: (1) Origins of the Genome Project, (2) The Genome Project and Eugenics, (3) Is a Strong Genetic Reductionist Program Possible? and (4) Reductionism, Determinism and Theological Humanism. Contributors include preeminent philosophers, theologians, scientists and historians of science from France, Great Britain, and the United States: John Beatty, Robert Bud, Arthur L. Caplan, Alice Domurat Dreger, Kevin FitzGerald, Jean-Paul Gaudilliere, Jean Gayon, Marguerite Hays, Lily E. Kay, Evelyn Fox Keller, Philip Kitcher, Timothy Lenoir, Edward Manier, Richard A. McCormick, Ernan McMullin, Timothy Murphy, John M. Opitz, Diane Paul, Arthur Peacocke, Martin S. Pernick, Hans-Jorg Rheinberger, Kenneth Schaffner, and John Staudenmaier.

My professional training is in cell biology, so this review does not stem from special expertise in any of the humanistic disciplines represented by the contributors. I undertake it because of an interest in the interface between science and the humanities nurtured for several years by involvement in an interdisciplinary, undergraduate world history program that examines connections between the "two cultures." I know what a genome is and basically how genes and other cell parts work, so at least I am able to judge whether the humanistic perspectives expressed in this book are rooted in an accurate understanding of the relevant science. At most I can give a biologist's evaluation of some of those perspectives and the clarity with which they are expressed. Although even a cursory review of every essay would be impractical, I will comment on several that I found insightful, provocative, or especially informative. I also include opinions about the balance of subject matter contained in the book and the collection's usefulness to scientists and teachers.

In June 2000, Francis S. Collins and J. Craig Venter, leaders of the public and private sectors' genome sequencing efforts, respectively, announced virtual completion of the project which originally was not expected to be finished until 2005. That the conference at which the papers in this book were presented occurred five years earlier in no way diminishes its relevance to the social issues that completion of the HGP thrusts before us now.

How humankind as heirs of the scientific revolution and the Enlightenment and/or the United States as a modern democracy came to commit itself to the HGP are subjects addressed by Sloan's introduction, "Completing the Tree of Descartes," and of essays in Part 1.

Sloan carries the reader from Descartes' dualistic view of humankind (transcendent mind separated from material body, with the latter understood as a hydraulic machine subject to the laws of a mechanistic physics) through eighteenth-century vitalism and ultimately to the emergence of a new form of reductionism for nineteenth-century life science. Sloan argues that although the

nineteenth-century developments bore no immediate historical connections with the Cartesian project they retained striking conceptual resemblances to it. An experiment-based, chemical-physical explanation for body heat via the work of Lavoisier in the 1770s and '80s presaged the statement by Emil Dubois-Reymond, a biophysically oriented, late–nineteenth-century medical physiologist of the Berlin Physical Society, that "no other forces than the common physical-chemical ones are active within the organism."

Reducing the biological to the physical has continued to be a hallmark of the modern reductionist program in the life sciences. Twentieth-century manifestations of that program include the biochemical characterization of metabolic pathways, the discovery of double-stranded DNA structure, and the HGP itself. Sloan acknowledges the great potential of the HGP to provide a bounty of medical benefits for humankind. But he is unsettled by the presumption of many scientists and self-anointed explainers of science to the general public that the reductionist program in biology and molecular biology in particular will ultimately be able to explain humankind's theological bent and provide a full explanation of self-reflective consciousness in purely physical terms.

Digesting the final eleven-page section of Sloan's essay subtitled "Genomics and Reductionism" was difficult for a mere scientist but became possible with the aid of the *Routledge Encyclopedia of Philosophy* after the third or fourth reading. In this section Sloan argues for a return to Descartes' metaphorical tree of human endeavors in order to recall that Descartes placed (properly so, says Sloan) theological/human consciousness issues at the root of the tree. He viewed these as reflecting a priori preconditions for the mechanistic, reductive science that forms the trunk of the tree and from which emerge the various branches of knowledge: medicine, mechanics, and ethics. Via tortuous paths, Sloan sides with Descartes in arguing that knowledge about theological issues and the reality of humankind's reflective nature are not subject to causal analysis via the scientific method. Although Sloan never says so directly and with clarity (at least for me), the title of his essay appears to refer to the opportunity that modern molecular biology and strong reductionism in the other sciences have for adorning the tree's branches with fruits, elements of the metaphor that Descartes' early death at 54 prevented him from fully developing. None of these will be metaphysical fruits, though, and none will show us the meaning of our existence or the values that we should embrace, according to Sloan. "Returning to Descartes' Tree" would have been a more apt title for this essay, because most of Sloan's effort is an attempt to persuade us that "wisdom emerges not out of our physics and biophysics, but from our recognition of our science as a product of human consciousness reflecting upon itself" (p. 26). Although hard-core sociobiologists and strict materialist neurobiologists will find many points for disagreement in this essay, it does very nicely frame many of the philosophical, theological, historical, and ethical issues addressed in detail by other authors in subsequent essays.

Of the five essays in Part 1, the first and last were my favorites. In "The Manhattan Project for Biomedicine," Lenoir and Hays tell of the continuity between the government's atomic bomb project of the 1940s and today's public HGP. With interesting historical details and in clear prose, they explain how the U.S. government purposefully transferred resources and personnel after World War II from a nuclear bomb effort to a nuclear biomedical effort that included

the development of radioisotopes for biology, radiopharmaceuticals, bioinstrumentation including scintillation counters, and establishment of the discipline of radiological safety. Along with this massive and successful government technology transfer came incentives for involvement of private industry and public universities in biomedical research. The Atomic Energy Commission and biomedical elements of its founding charge in 1946 drove this transfer of technology. Although the HGP of the 1980s was a natural outcome of the redirection of national attention toward biomedicine forty years earlier, a selling job still had to be done on the public and the scientific community before the HGP could be legislatively established as a national scientific priority akin to the moon project of the 1960s. How this was accomplished is the subject of Dreger's wonderfully revealing and very readable "Metaphors of Morality in the Human Genome Project." The essay reveals how proponents of the HGP managed to make it patriotic to support the endeavor and unpatriotic to oppose it. Although many scientists advanced reasonable arguments that allocating billions of dollars to the HGP would cripple many other areas of basic and applied biological research, proponents of the program won the day by appealing to Americans' pioneer penchant for conquering frontiers and our hearty willingness to root out and destroy "bad things"—in this case, disease-causing genes. Reproductions of cartoons playing/preying upon these inclinations as well as one satirizing this approach (i.e., James D. Watson draped in the red, white, and blue) add an effective touch to this essay.

All three essays in Part 2 on eugenics are excellent and accessible to readers from all disciplines. By reviewing the history of the eugenic movement in the U.S. in the first third of the twentieth century, Pernick's "Defining the Defective: Eugenics, Esthetics, and Mass Culture in Early Twentieth-Century America" sounds a warning for future eugenic programs that may make use of diagnostic and therapeutic techniques emerging from the HGP. He argues convincingly that decisions on what constitutes beauty or genetic defectiveness are largely value-based and controlled by the mass media, leaving the door open for racial, gender-based, and ethnic prejudices to drive eugenic decisions. "Do esthetic values create disability, in the same way that high stairs and other physical barriers do?" Pernick asks (p. 208).

Caplan's "What's Morally Wrong with Eugenics?" categorizes eugenics in two ways: negative vs. positive and individual vs. population. After discussing the outlook for selectively eliminating early embryos on the basis of their genetic constitution (negative eugenics), the purposeful alteration of the genetic information in germ cells (positive eugenics), and the terrible consequences of coercive, government-sponsored eugenics (population eugenics), Caplan defends the right of individual couples to strive for the "perfect child" by whatever legal, noncoercive means technology offers (individual eugenics). Several arguments against this position are addressed by Caplan, who maintains that overriding all of these is the "right to reproduce without interference from third parties [as a] fundamental freedom recognized by international law and moral theories from a host of ethical traditions" (p. 219).

The final essay in this section, "Utopian Eugenics and Social Inequality" by Philip Kitcher, is the most startling and the most morally challenging of the three. It is startling because the reader is made to realize that whether to practice eugenics is not optional because "once we know how to identify . . . genotypes of future

people, eugenics is the only option . . . once we lose our genetic innocence, we have alternatives, and, because we have to elect one of the alternatives, we have to practice eugenics" (pp. 237–38). It challenges societal morals by asking, "why should we rush [to develop gene therapy procedures] to treat the unfortunate genetic inheritance of the few, while ignoring the unlucky social inheritance of the many? Shouldn't we commit ourselves to change the environments that break young lives as surely as defective proteins?" (p. 240) Kitcher maintains that there is no reason to believe that the medical benefits of the HGP will be any more justly distributed among those in need of them than are other resources now such as food, shelter, and education opportunities. Which should receive priority—research for genetic therapy for the few or a commitment to allocate our present resources to bringing nearly everyone's expected quality of life to a minimal level? For Kitcher, a utopian eugenics is premised upon freedom of reproductive choice for all and can occur only if all infants born with debilitating genetic conditions are offered the best support available and are assured that they can live their lives free of social prejudices.

Two essays and accompanying commentaries constitute Part 3, on the outlook for a strong genetic reductionism—the notion that we can understand organisms, including their physiological functions, heritable disease states, and behavior by studying their genes. These contributions disappointed me. The first, "Is There an Organism in This Text?" by Keller is a history of the metaphors used to describe the unit of heredity, beginning with the pangens (minute particles in germ cells) of Hugo DeVries (1889) and ending with Henri Atlan's (1990) "multi-layered parallel computer network" (quoted on p. 289). Keller was educated as a physicist and now writes about the history of biology. This contribution complements that of Kay's history of molecular genetics in Part 1 and would more appropriately have been placed there.

The second by Schaffner, a philosopher and M.D., argues against the prospect for a strong genetic reductionism. To bolster his view, Schaffner points out that even in one of the simplest and most thoroughly studied multicelled organisms, the 959-celled roundworm *Caenorhabditis elegans* with an entire nervous system comprising just 302 neurons, behavior is very difficult to characterize in terms of the activity of specific genes. One of eight reasons cited for this is the so-called *many-genes one-neuron* rule, meaning that the coordinated activity of many genes is required for the existence of a single neuron. The implication is that the complexity of gene expression that must be required to build and sustain neural networks in even the simplest organisms defies an exhaustive genetic analysis of the behavior that emerges from those networks. Schaffner is right that many genes are required to produce a single neuron; in fact, this is true for any type of cell, and the number of genes is more than "many"; it is thousands. The majority of these genes are "house-keeping" genes whose activity is required for the life of any cell. The number of genes whose action make one cell type different from another cell type is relatively small by comparison. Furthermore, an electrician does not need to understand the behavior of every electron in every wire in order to accurately read a circuit diagram or even to modify the diagram so as to alter the function of a device. I am not as doubtful as Schaffner is about the prospect for understanding neuroanatomy and behavior in terms of gene action. Consider the exponential growth of our understanding of living systems and the technolo-

gies for their analysis over the past thirty years. No one predicting in 1970 that an HGP would be undertaken and completed before the turn of the millennium would have been taken seriously. And at the inception of the HGP in the mid-1980s, no one foresaw the microarray technology that now allows patterns of gene expression to be analyzed in single cells or the formation of a new discipline called proteomics whereby the complex interactions of the protein products of gene expression will be made to give up their secrets. Balance of outlook in this section could have been obtained by contributions from a practicing molecular biologist and a sociobiologist.

The five essays in the final section of the volume take up theological questions emerging from the HGP, questions that in one way or another ask what it means to be human and what might be the limits of science in understanding human life in all of its dimensions. Some are more direct about it than others, and the approaches vary, but each author in this section seems to be either attempting to leave room for God in humankind's odyssey or presuming God's presence in moral theologies. At the same time, there is no hint that any one of the authors doubts our origin through naturalistic, evolutionary processes or our aliveness due to nonvitalistic phenomena whose details will become increasingly revealed by information emerging from the HGP. FitzGerald's paper on philosophical anthropologies is an inspired discussion of the critical importance of our approach to understanding human nature when developing ethical systems to guide the use of biotechnologies that themselves may be applied to the purposeful sculpting of human nature. McCormick's piece on moral theology contains a wonderful 1982 quotation from the U.S. House of Representatives which highlights the concern voiced earlier by Kitcher about national priorities and social justice: "Most countries of the world can afford little or nothing for elaborate genetic research. In this country, what resources should go into genetic therapies that may some day cure cancer as compared with correcting environmental causes of cancer that are operational right now? What resources should be assigned to research into the unknown as compared with correction of nutritional deficiencies for which answers are available now?" (p. 425) The relevance for the global community of some of McCormick's other points, such as his discussion of abortion and genetic discrimination, seem handicapped by their decidedly Roman Catholic Christian perspective. In other spots, however, he sets a high standard for Christian dialogue on thorny bioethical issues by suggesting that Christian emphases and tradition are more useful as value raisers than as answer givers.

Opitz, a clinical geneticist, believes that medical schools need to do a better job of reminding future physicians that despite the many recent discoveries in molecular biology, the ethical basis of medicine has not changed. This would be a worthy point were it not presented in the context of his view that abortion of genetically defective fetuses amounts to the wrongful disposal of a defective part of the mother. He even likens therapeutic abortion to the excision of Native Americans, Jews, and other ethnic subpopulations from society via butchery by a more powerful element in the population. Near the essay's end Opitz makes the more constructive comment that the eugenics to be made possible by the HGP may necessitate a need for an international panel of ethicists to review national policies toward the genetically defective. The means for selecting members of such a panel and for enforcing its recommendations, however, are not discussed.

Emergentism and its theological implications are the foci of Peacocke's and McMullin's essays. The term *emergence* was coined in 1875 by G. H. Lewes. It refers to a higher-level property of a system being irreducible by the natural laws governing the constituents of a lower-level property from which it is derived. The term appears often in the current literature on human consciousness. For example, an emergentist would maintain that self-reflective human consciousness is not understandable solely from the biology governing the lower-level properties of synapses and neurotransmitters upon which it depends. Emergentism may also be invoked in the physical sciences; but these authors apply the concept in discussions about the soul and humankind's relationship with God ("soul" and "God" left undefined). When brain became mind, mind became instilled with soul, and soul entered into communion with God during the evolutionary process need not be issues for emergentists, according to McMullin, if the Creator is seen as sustaining a natural order of causes and effects producing higher and higher levels of existence and ultimately the emergence of soul. And Peacocke, who sees intention and purpose through evolution without determination, observes that "it would be unwise to place too much hope in the ability of any directed genetic engineering to ameliorate the general human condition, especially the psychological and spiritual" (p. 365). I found both essays intriguing but was left yearning for a contribution from a sociobiologist invited to speculate on the ultimate relevance of the HGP (and proteomics) for understanding humankind's religious inclinations. Also, since the DNA of humans differs only one percent from that of chimpanzees, I cannot help but wonder what the identification of the structure and function of the genes containing these differences might soon tell us about human consciousness and spirituality.

The greatest strength of this collection is that it contains excellent pieces for nearly everyone. Dreger's and Caplan's essays are beautifully written and ideal for undergraduate students. I know from classroom experience that the provocative information contained within them, and their focus on the science-media interface and the science-morality interface, respectively, stimulate vigorous and constructive discussion among freshman to senior-level students who have read the articles. Graduate students and scientists in molecular biology will benefit by reading about the origins of their discipline in the essays of Lenoir and Hays and of Kay. Pernick's piece should interest social scientists, clinical geneticists, and genetic counselors; moreover, the material is very appropriate for undergraduate students and even junior/senior-level high school students. For persons with theological interests working in any discipline, I recommend the contributions of McMullin, McCormick, and Opitz. Using the entire volume for a graduate seminar course on twenty-first–century biology and human values with professors from diverse disciplines present to lead the discussion would be great fun.

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Endmatter

THOMAS MERTON AND LEO SZILARD: THE PARALLEL PATHS OF A MONK AND A NUCLEAR PHYSICIST

by Phillip M. Thompson

Abstract. Thomas Merton and Leo Szilard, two of the seminal religious and scientific figures of the twentieth century, briefly connected on the issue of the danger of atomic weaponry. This meeting resulted from paths that guided them to an "orbiting" or distancing from human society through a phase of intellectual (Szilard) or spiritual (Merton) abstraction followed by a return to the concerns of human society. These parallel trajectories and their eventual intersection reflect both the similarities and differences in their respective backgrounds. The briefness of their contacts and the unfulfilled possibilities from such contacts also suggest the importance of a continuing dialogue between major figures in religion and science.

Keywords: angelism; atomic bomb; contemplative; Thomas Merton; nuclear science; peace movement; Walker Percy; religion and science; Leo Szilard.

When we consider what religion is for mankind, and what science is, it is no exaggeration to say that the future course of history depends upon the decision of this generation as to the relation between them.

—Alfred North Whitehead (1925, 181, 182)

An Unlikely Pair

Two very different men had life-changing revelations on street corners. Although apparently disconnected, these street-corner revelations would be important in merging their life journeys toward a point of contact.

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It was the fall of 1933 in London. A 35-year-old Jewish scientist, Leo Szilard, had recently fled to England because of the Nazi rise to power. As was his habit, he was briskly walking along the streets and pondering a profound scientific dilemma. Then, it happened.

> As I was waiting for the light to change and as the light changed to green and I crossed the street, it suddenly occurred to me that if we could find an element which is split by neutrons and which would emit two neutrons when it absorbed one neutron, such an element, if assembled in sufficiently large mass, could sustain a nuclear chain reaction. I didn't see at the moment just how one would go about finding such an element or what experiments would be needed, but the idea never left me. (Lanouette 1992, 133–34)

The intersection revelation provided Szilard with the key direction needed to produce a nuclear chain reaction and the idea of a critical mass that were the essential elements for producing an atomic bomb. For the next three decades he would be obsessed with first creating and then controlling the bomb that resulted from additional work on his initial revelation.

Several decades after Szilard's epiphany, 42-year-old Trappist monk Thomas Merton was standing on a busy street corner in downtown Louisville, Kentucky. His revelation was not about a division in nature but about the essential unity of human beings. "I was suddenly overwhelmed with the realization that I loved all those people, that they were mine and I theirs, that we could not be alien to one another even though we were total strangers. It was like waking from a dream of separateness, of spurious self isolation in a special world" (Merton 1966, 156–57).

Merton's revelation changed his connection to the secular world that he had abandoned in disgust in 1941 when joining the Trappist order at the abbey of Gethsemani. By ending his "spurious isolation," Merton would reenter the fray of human works, culture, and even politics with a passionate desire to contribute more to the broader human community. This new desire did not require an abandonment of religious vows or a departure from the monastery, although he speculated about these possibilities. The real transformation was in his attitude about the kingdom of God on earth, not geography or institutional commitments. He could now unequivocally lend his voice not only to an internal spiritual quest but also to interreligious dialogue, the Civil Rights movement, and opposition to nuclear proliferation and the war in Vietnam.

On first review, the men experiencing these revelations and their insights could hardly seem more different. Szilard was a secular Jewish scientist from Hungary. He exhibited no interest in formal religion and was certainly not interested in contemplative traditions. To the extent that he had a religion, it was an Enlightenment one, favoring an impersonal entity sustaining the rational patterns of nature. Szilard rarely discussed his Jewish background. When confronted by angry students in Hungary about his being a Jew in 1919, he pleaded that his family were Calvinists—which

was technically true, as his family had a conversion of convenience. The usually combative science student was unusually submissive on this occasion. There may be other explanations than religious indifference. He detested violence and may just have been trying to avoid it on this occasion (Lanouette 1992, 49).

Raised and educated while on the move in France, England, and the United States, Merton's intellectual focus was initially in the humanities and later on spirituality. As a young man he demonstrated little interest in science or its progeny, technology. He had attended a few courses in astronomy at Columbia University in the 1930s but showed little aptitude in the natural sciences or its technological byproducts (Merton 1948, 66–67). The zealous and pious young novice at Gethsemani was full of disdain for science and technology. The regnant orthodoxies of science, technology, and materialism had ushered in an age of a potential apocalypse. Merton's response to this collapse of faith and culture was a "total rejection of the business, ambitions, honors, activities of the world." This rejection certainly included the technological inhumanity inherent in modern warfare. Although he fully accepted the Catholic doctrine of just war, he noted about the Second World War that "killing people with flame throwers" was no "form of Christian perfection." The technology of mass destruction on display in the war was also linked to the death of the last member of his immediate family, his beloved brother John Paul, who died an agonizing death as a downed bomber pilot. Merton's personal bitterness was further annealed by a continuing global violence abetted by the products of science. He lamented a century filled with "poison gas and atomic bombs" (Merton 1989, 10; 1977, 36; 1948, 85).

There were other differences with Szilard. After he entered the monastery, Merton yearned to travel but rarely did so. He was anchored by institutional rules and by a commitment to pursue a contemplative life. The contemplative ideals of peace, balance, and reflection contrasted sharply with the Hungarian's constant travel between hotels and a frenzied search for new discoveries and ideas.

Angelism

Because of the differences in occupation, lifestyle, and goals, the search for any correspondence between these very different men might appear daunting if not impossible. Their merging toward an alliance was possible, however, because of a series of historical and personal evolutions. Their evolutions reveal some striking parallels, including the tendency at different times in their lives to break radically from and toward the world, a love for and ambivalence about their vocations, and a tendency toward angelism.

The tendency toward angelism is a temptation common to religious and scientists. Novelist Walker Percy describes angelism as not a love of

angels but the tendency of intellectuals to zealously seek a specialized and esoteric knowledge that transcends ordinary human experience. Persons engaged in this quest often assume that their pursuit of an aspect of knowledge will yield some ultimate Truth. The inherent distortion in such a quest often eliminates or minimizes the value of other types of truth or reality. The seeker is propelled into an "orbit" of refined reflection that makes the reentry of the seeker into the normal flow of normal human life very difficult. A proper balance of physical, emotional, intellectual, and spiritual needs is lost to the demands of a pure and almost monomaniacal pursuit of the intellect or spirit (Percy 1983, 115–19, 135, 160–74).

The term *angelism* is a key to why Szilard and Merton shared some common ground throughout their lives. In addition, the strength of angelism would make it difficult for both men, although not necessarily in an identical fashion, to transcend the obligations, restrictions, and prejudices of their orbiting phases and reenter their societies and seek a mutual collaboration on the issue of nuclear weapons. Szilard's life often demonstrates Percy's observation that

> The scientist is the prince and sovereign of the age. His transcendence of the world is genuine. That is to say he stands in a posture of objectivity over against the world. . . . The problematical self, like the young Einstein who couldn't stand the dreariness of everyday life, discovers science and transcends the world. In orbit, he enters an elect community of scientists, however small, to whom he can address sentences about the world. (Percy 1983, 115)

Even in his early years, Szilard's faith in objective science made him detached from and defiant of the rather staid and conservative society of Austria-Hungary before World War I. To many of his peers, the young man seemed rude, impertinent, and socially inept. The truth is that the rebellious youth valued the search for knowledge more than social conventions or human relationships. He was known to quickly drop a friend who ceased to challenge his intellect or to abruptly depart a party without saying anything when he was reflecting on a pressing problem. Ideas were the priority of his life, and institutional or personal commitments that made human beings seek security over intellectual exploration were shunned. This utter devotion to the pursuit of knowledge was noted even by an FBI agent spying on him at the end of World War II who described him as a "complete egotist, an internationalist, an idealist, self sufficient" (Lanouette 1993, 27).

Many sacrifices were dutifully made in order to obtain this transcendence, this orbit. Szilard left his native Hungary as a young man, rarely saw his family, had few significant relationships with women, and lived simply and transiently, always ready to move as his field of knowledge and the ends of his profession dictated. Throughout his adult life, his personal possessions were kept in two bags that were always packed for a sudden departure (Lanouette 1993, 150–51, 161–73).

The prospect of reentry from his orbits was tricky. There were some furtive attempts. He was not averse to dating women briefly, observing the beauty of nature, or watching Charlie Chaplin movies. Corresponding to Percy's formulation of angelism, these brief forays into the world typically involved little or no depth of human interaction. Indeed, Szilard, until he became close to Gertrude Weiss in the latter part of his life, had almost no close relationships. He lived to intellectually parry and thrust with elite physicists including Albert Einstein, Niels Bohr, and Edmund Teller. Within this tiny "priesthood" there was a bond built from a shared understanding of the obscure intricacies of atomic science. Mere mortals who might attempt to comprehend its complexity were readily dismissed unless they provided sources of funding for research or could help translate this specialized knowledge into a technical achievement. In the end, the orbiting pressures were severe. Still, this feature of transcendence was a key animating force in his life. Perhaps this is why one biography (Grandy 1996) is titled *Leo Szilard: Science as a Mode of Being*. Another biographer, William Lanouette, aptly describes his impulse to angelism as follows: "But for Szilard, knowing and understanding were not enough. His thoughts about his world attained a reality of their own, and his life became an urgent struggle to animate these thoughts and perhaps control them. For many hours a day Szilard kept company with thoughts that drew him, logically and persistently, toward a future that often he alone could see" (1993, 150).

The eager young monk who entered Gethsemani in 1941 also was interested in pursuing an abstract concept, a specialized form of knowledge available to only a few. The objective was not the smallest of objects, an atom, but the largest, God. The spiritual quest as Merton formulated it in his early years in the monastery was one that was largely closed to the outside world. It assumed that there is a contemplative power of an elite of religious who focused on what was written on a sign on the wall of the monastery, "God Alone."

Merton notes in these early years that Gethsemani had a "rare atmosphere of a very high mountain." The atmosphere was rare because religious orders were the "loudest and truest" in proclaiming God's honor, power, and greatness. This special pilgrimage was pursued in the spiritual laboratory of the monastery, isolated from the cares and worries of the broader world. The overpowering force of the spiritual presence in the monastery could not be conveyed to those who had not renounced worldly ambitions and entered into the "impregnable fortress" of solitude. Once a monk was "submerged" in this community, the "world would hear of him no more because he has drowned to society and become a Cistercian" (Merton 1948, 321–25, 332). The broader problems of the human world were not forgotten, but the emphasis was on how to internally curb the innate attraction of a sinful humanity to "greed and lust and cruelty and hatred

and avarice and oppression and injustice, spawned and bred by the free wills of men" (1948, 128). Merton's interest in these early years of his religious life was on human sin and divine mercy, not on social reform. Such sinfulness posed a serious challenge to achieving the special knowledge of the contemplative.

Reconnecting with Humanity

Szilard, unlike many of his scientific colleagues, had always desired to save the world through a rational form of government ruled by a scholarly elite. When the German threat of an atomic bomb ended with their surrender in the spring of 1945, he still wanted a rational elite to govern this new weapon and to protest the use of atomic weaponry against Japanese civilians. The youthful search for utopian solutions was now modified by experience and replaced by the more realistic objective of trying to limit the chances for damage from the weapon. His elitist and utopian tendencies were channeled into assisting in the formation of a number of scientific publications and social organizations with specific goals, such as *The Bulletin of Atomic Scientists*, The Council for Abolishing War, and The Council for a Livable World. These organizations sought to lessen the possibility of another use of the ultimate weapon. A proposed National Society of Fellows was designed to provide the President of the United States with advice on contemporary issues facing the country (Grandy 1996, 126; Lanouette 1993, 437).

The elitist tendencies were thus transformed from producing new knowledge into discovering how to restrain the results of a prior discovery, the splitting of the atom. Moreover, some of the isolation from his angelism softened during his happy marriage and partnership with Weiss in the 1950s. The elitism also slackened with the passage of time. He made some efforts to get nonscientific individuals involved in his projects. The change is dramatically reflected in a letter to *The New York Times* in 1955 in which he asked all citizens of the United States to take responsibility for their lives and push their government for an arms agreement with the Soviet Union (Grandy 1996, 127). Admittedly, this new project was still a large challenge with some utopian dimensions, but Szilard was, if not completely changed, at least a chastened contributor to human society.

Merton's turn toward the world was gradual, and his street-corner revelation was in some sense a recognition of where the preceding decade had taken him. On a previous trip to Louisville in 1948, he still rejected the illusions of the world but felt closer to individual persons. In his journal he recorded, "Although I feel alienated from everything in the world and all its activity, I did not necessarily feel out of sympathy with the people who were walking around. On the whole they seemed to me more real than they ever had before, and more worth sympathizing with" (Merton 1996, 223). In addition, Merton had already in the late 1940s and early

1950s begun to experience heightened discomfort with military activity, including the booming guns at Fort Knox and atomic weapons (Merton 1953, 81).

The rising sense of solidarity in Merton also was confirmed by a new interest in scientific matters by 1957. He was soon reading biographies of a number of physicists, science fiction, and journals like *Scientific American*. With a typical enthusiasm, his diary speaks of the "beautiful mind of Einstein" and refers to "Niels Bohr and Co." as his "no. 1 cultural heroes" (Mott 1993, 482).

Merton's renewed interest in science came at a time when he also was beginning to more explicitly oppose the nuclear weapons race. The nuclear issue was intimately connected to the superpower struggle between two systems of false materialism that made them adopt a mindless activism. This activism engaged in processes that were instrumentally sane but teleologically insane. Merton decried the prospect of a nuclear war initiated by sane men operating under sane orders. The superpowers were bound, at least partially, to this form of activism because the building of weapons maintained their national affluence. The combination of a blind activism and economic imperatives made the United States and the Soviet Union irresponsible in regard to technological advances (Merton 1980, 12–19).

Brief Contact and a Lost Opportunity

It is unfortunate that there is not a more storybook ending to this tale. The elements for such an ending appeared to be present in the early 1960s. The bomb had fostered social concern and activism in both men. They were both eager to discover allies against the threat of nuclear proliferation and destruction.

By 1962, Merton wondered whether it was possible to bring Szilard and the other peace movements under a common umbrella organization to exert some collective pressure on the political process. To secure a common effort, he proposed in an April 1962 letter to the scientist a common front. The letter praises Szilard's recent work, offers to donate royalties from a recent book to a Catholic peace group, and criticizes certain Catholic realist thinkers on nuclear weapons. There is also praise for the scientific opposition to the bomb that countered the "absurd, inhuman, and utterly distorted assumptions that have become the basis of thinking of the majority" (Merton 1994, 38). Szilard responded with a letter on 2 May 1962 in which he expresses gratitude for the interest and promises to keep Merton notified of his program of securing signatures in opposition to the bomb (Szilard 1962). There were no additional efforts at contact. Szilard died two years later, and the opportunity for close cooperation was lost.

If there had been a meeting of the two men, it might have been very stimulating. They shared the common traits of being persons of diverse

and constantly mutating enthusiasms, committed to grand goals, and capable of challenging the shibboleths of their age. Considering those points of commonality, it would have been intriguing for Szilard to have visited Gethsemani. Where would the conversations have taken them? Could they have contributed to greater cooperation in areas of mutual interest or assisted in breaking down the walls of distrust between religion and science? Of course, expectations are often greater than realities in such meetings (see Kramer and Kramer 1985, 309–20). It is impossible to say what would have happened. But let us hope that religious and scientific leaders today do not miss such opportunities.

Note

A version of this article was published in *The Merton Seasonal* 2 (Summer 2004): 30–36.

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Traditional religions, which have transmitted wisdom about what is of essential value and ultimate meaning as a guide for human living, were expressed in terms of the best understandings of their times about human nature, society, and the world. Religious expression in our time, however, has not drawn similarly on modern science, which has superseded the ancient forms of understanding. As a result religions have lost credibility in the modern mind. Nevertheless some recent scientific studies of human evolution and development have indicated how long-standing religions have evolved well-winnowed wisdom, still essential for the best life.

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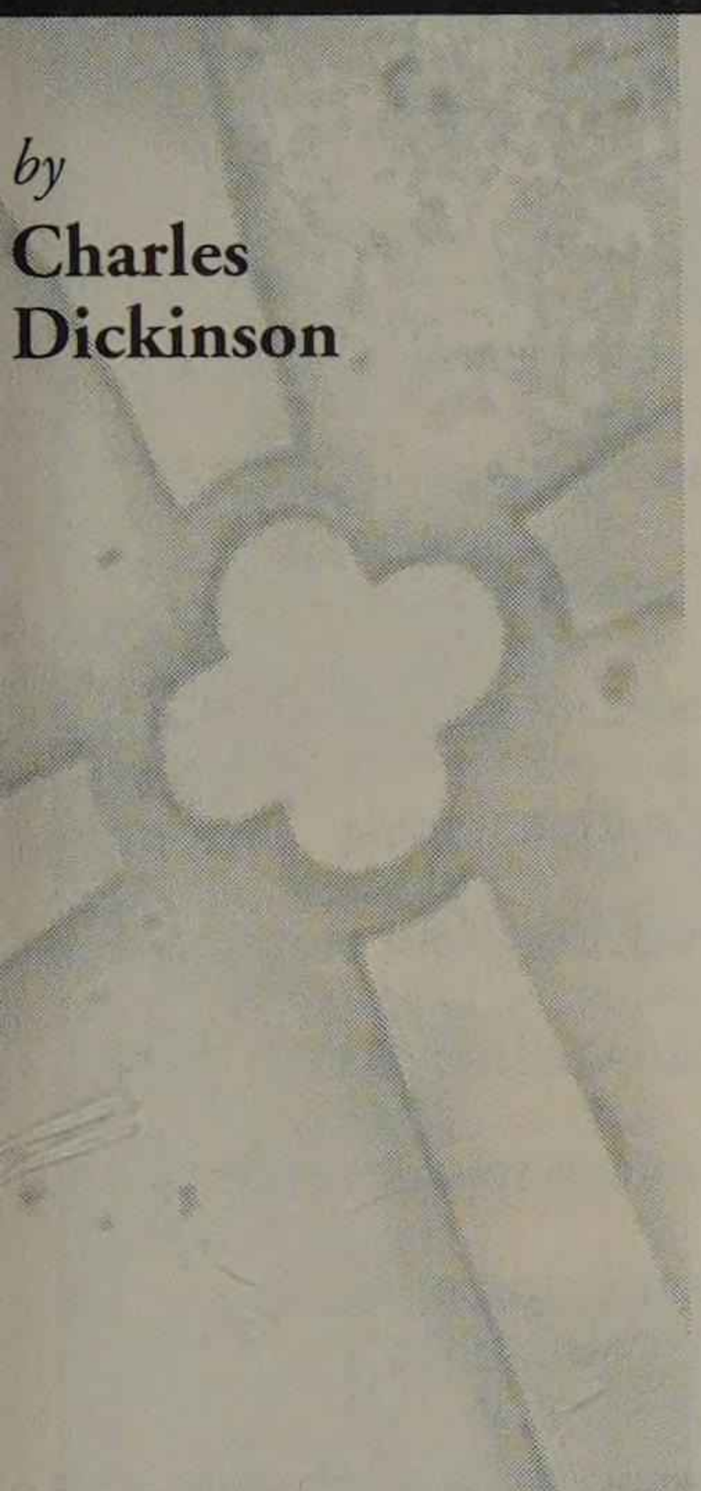
The Dialectical Development of Doctrine

A Methodological Proposal

by
Charles Dickinson



If Christianity—including Christian faith and theology—is to avoid becoming totally out of touch with the world—a museum piece at best, a force of baleful reaction at worst—it must constantly update itself by constant interaction, dialogue, dialectic with all the important intellectual currents, movements, disciplines of today. In the process, it must not lose its soul, or else it becomes useless. But, as Friedrich Schleiermacher said, it must open its windows to the world, lest it become irrelevant or even harmful.

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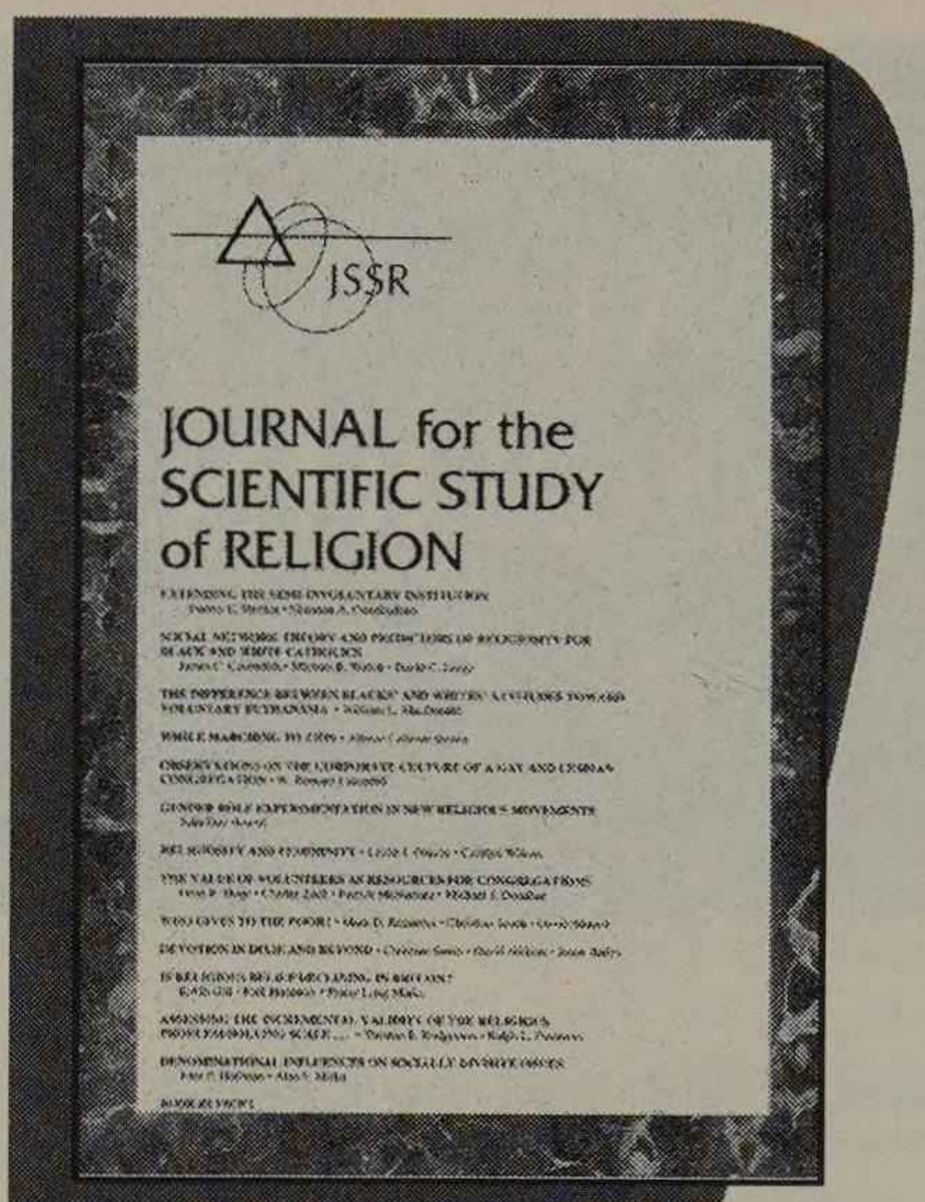

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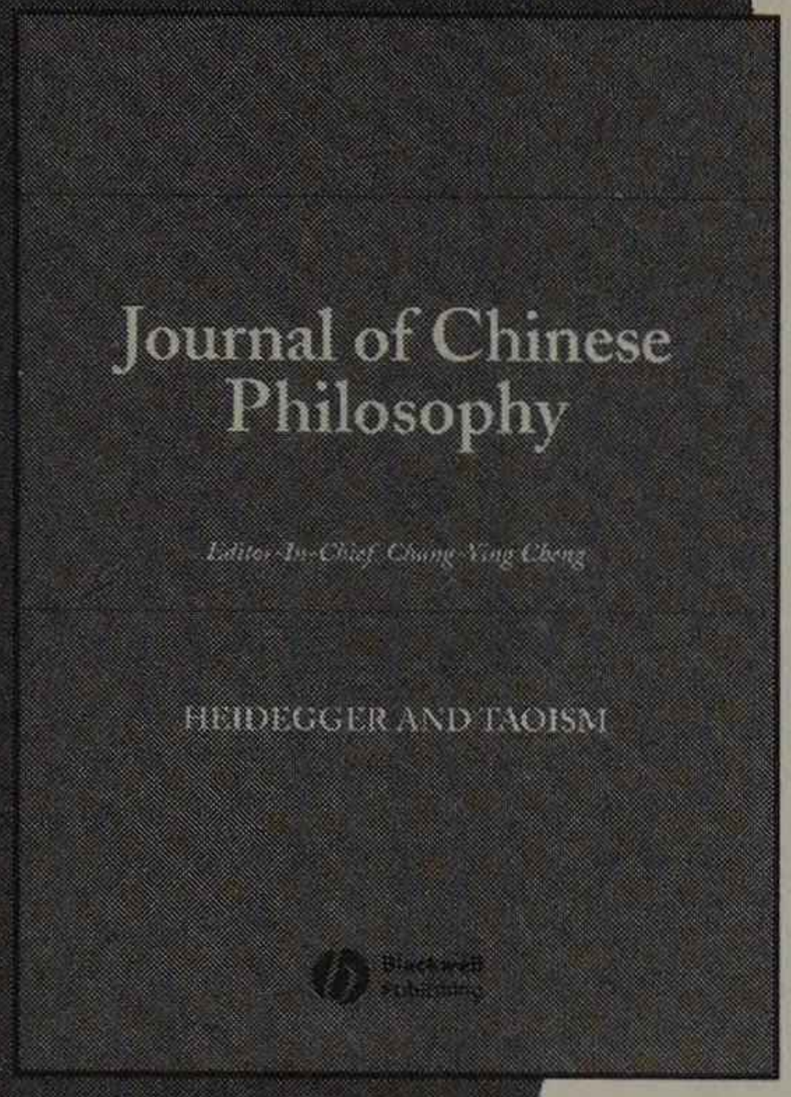

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