RELIGION AND SCIENCE CONVERSATION: A CASE ILLUSTRATION

by James B. Ashbrook and Carol Rausch Albright

Abstract. The March 1999 issue of *Zygon* provides a case illustration of a religion-and-science conversation. The three responses to the issues raised by *The Humanizing Brain* represent a spectrum ranging from skepticism to affirmation. Each is examined in turn. Next, we present a constructive set of guidelines beginning with the recognition that interdisciplinary talk requires stretching disciplinary language into metaphor and analogy. We conclude with a methodology emphasizing empiricism and wholism.

Keywords: complexity; empirical theology; evolution; mind-brain; the neurosciences; neurotheology; wholism.

Recently, the popular media have "discovered" scientists and religionists talking with each other. After a hundred years of "warfare between science and religion" there are signs of rapprochement, or at least tolerance of each other's domain. Too often overlooked is the work of such thinkers as Alfred North Whitehead in the earlier half of this century and Ralph Wendell Burhoe, Langdon Gilkey, Wolfhart Pannenberg, Philip Hefner, and others in recent years. Paleontologist-theologian Pierre Teilhard de Chardin, philosopher-biochemist Michael Polanyi, physicists such as Paul Davies and John Polkinghorne, biochemist Arthur Peacocke, neurophysiologist John Eccles, physicist–religion professor Ian Barbour, and philosophers Nancey Murphy and Philip Clayton are among those who have taken groundbreaking steps in bridging the chasm. Creationists and reductionists

James B. Ashbrook was Professor Emeritus of Religion and Personality at Garrett-Evangelical Theological Seminary, Evanston, Illinois. He died on 2 January 1999. Carol Rausch Albright, a scholar and writer, is Co-Director of the Midwest Region of the CTNS-Templeton Science and Religion Course Program; her mailing address is 5415 S. Hyde Park Boulevard, Chicago, IL 60615, and her e-mail address is Albright1@ aol.com.

[*Zygon*, vol. 34, no. 3 (September 1999).]
 ISSN 0591-2385

remain on the fringes of the conversations, refusing to engage in fruitful and constructive interchange. Many others do not participate because they have never heard the conversation.

By focusing on *The Humanizing Brain: Where Religion and Neuroscience Meet* (1997), the March issue of *Zygon* provides a specific work sample of one conversation between religionists and scientists. A skeptical philosopher, a pragmatic clinician, and a professor of biblical studies and theology each responds and critiques the position from a unique vantage point. The resulting configuration of ideas provides a spectrum of a religion-and-science conversation.

In his Gifford lectures (1989–91), Ian G. Barbour lays out the range of "epistemological assumptions" of recent authors addressing the science-and-religion relationship (1990, 3–30). He identifies four types of assumptions about this relationship: (1) conflict, exemplified by the clash of scientific materialism and biblical literalism; (2) independence, including contrasting methods in which science is based on human observation and reason while theology depends on divine revelation and differing languages; (3) dialogue, dealing with boundary questions, especially issues of contingency and orderliness; and (4) integration between the content of theology and that of science. Attempts at integration may be based on (*a*) a natural-theology approach, in which arguments for God's existence depend completely on human reason; (*b*) a theology of nature, which starts from "religious tradition based on religious experience and historical revelation" and takes account of nature as "a dynamic evolutionary process with a long history of emergent novelty, characterized throughout by chance and law"; or (*c*) a systematic synthesis approach, which emerges when each domain contributes to "a coherent worldview elaborated in a comprehensive metaphysics" (Barbour 1990, chap. 1). Barbour observes that few attempts at science-religion dialogue fit neatly into any of the categories delineated here (Barbour 1997, 77).

How does this case conversation fit into such a schema? As Barbour predicts, not easily. The form of empirical natural theology proposed in *The Humanizing Brain* combines the empirical cognitive processes of the brain (in contrast to the logic of rationality), the experiential traditions of religious communities (in contrast to ideological identification), and recent findings about the increase of complexity when order and disorder interact (in contrast to linear theories). Such an approach evokes modified forms of all four assumptive positions: (1) it prompts tension about underlying *assumptions* rather than conflict about basic orientations; (2) because it takes a wholistic approach to reality, it assumes semi-independence of disciplines rather than complete independence; (3) it assumes and employs multiple domains of discourse instead of a two-way dialogue (as though "science" and "religion" were two monolithic realms); and (4) it aims for a configuration of disciplinary insights rather than integration,

which seeks a systematic synthesis. A configuration of disciplines precludes any one domain from being "king of the hill" or "queen of the sciences." We would argue that no systematic, comprehensive cause-and-effect synthesis can ever be found, because the limits of knowledge preclude it. As Kurt Gödel ([1931] 1962) has shown, no system can be both coherent and complete. Every subset of rational discourse rests upon at least one foundational thesis that, on principle, can never be proven. So to synthesize all knowledge we would need to combine a congeries of unprovable foundational theses—certainly constructing a hodgepodge.

We see talk among the domains of religion and science as both complex and simple. We must first confront the complexity of assumptions. What follows is relatively simple in comparison. In such conversation no question, no issue, no assertion can be taken as self-evident. In fact, our task is precisely that of opening up such questions by examining their particulars and identifying their generalizations. Ultimately, all assertions rest upon premises that can be explained only in part. Nonetheless, the human drive and need for knowledge demand that we keep processing and refining the partial explanations that are available, based on our best current evidence.

We begin by responding to the three response papers. We then suggest some guidelines for the conversation and, finally, deal with the methodology that results.

A Spectrum of Perspectives

A Philosopher's Skepticism. William A. Rottschaefer in "The Imago Dei of Neurotheology: Reflections of Culturally Based Religious Commitments or Evolutionarily Based Neuroscientific Theories?" (1999) contends that our theology does little but raise the discredited flag of anthropomorphism. But we see a critical difference between the anthropomorphism that he rejects (and that Ludwig Feuerbach ridiculed; see Feuerbach [1845] 1957) and our perceptions of the "humanizing brain," which we discuss in more detail below. The anthropomorphism that Rottschaefer attributes to us is dismissed as not only "evolutionarily unlikely" but as deriving "more from [our] Christian religious commitment . . . than from evolutionary theory." Notice that he uses *theory* rather than *data*, which puts his position in an arena of interpretation instead of certainty. We have, he contends, enveloped an evolutionary perspective with our own theological position.

Rottschaefer's own position appears to be a position of conflict between the two domains, or possibly of dialogue. Yet every interdisciplinary conversation begins at a disadvantage. Each domain of discourse has its own language, its own methodology, its own culture. To move beyond them requires stretches of imagination and inference. Mathematical language or cause-and-effect language is too limiting. Therefore, we are thrown into

an arena of (1) metaphor, which acknowledges cases in which one-to-one correlational speech is not adequate, and (2) analogy, which then attempts to specify correlational connections. No one can move between levels of organization without making great inferential leaps. These observations may make science-religion dialogue appear next to impossible.

Yet every scientist and every religionist proceed on the assumption that there is an orderliness, if not a meaning, to his or her life tasks. We do not live in a vacuum of unrelated and unrelatable information. Further, empirical data or evidence is always being subjected to culturally bound perspectives so that we as a culture can arrive at consensually agreed-upon ideas of "what is real." This applies to the human sciences and the humanities more than to the physical and natural sciences, but in *all* realms of knowledge intentionality is an elusive but primary consideration, because the brain's processes intrinsically involve it. As Antonio Damasio argues at length (1994), the mind-brain reaches conclusions through both representational information processing and emotional impetus. Terrence W. Deacon tells us that, in human thought, information processing through a hierarchy of symbolic connections transcends any and every immediate stimulus (Deacon 1997).

The "humanizing brain" may in fact project its own concerns onto ambient reality, but this is not why we say it is humanizing. The term, instead, points to a reality so obvious as to court invisibility. All data that we observe in the environment, and all the concepts that we form on this basis, come to us through the brain. Therefore, they are limited to what the brain and related sense organs can observe and process, and they are processed only in ways that the brain can perform. As a result, everything that we humans think and perceive necessarily is limited and shaped by the human brain—it is *humanized.*

We also make some other crucial assumptions in our analysis. Like the first, they may seem so obvious as to be ignored, but in fact they have important consequences. First, we assert that the human brain is made of the same elements as everything else in the world, is subject to the same physical laws—those of gravity and thermodynamics, for example—and operates through the same chemical and physical processes as everything else. It is *of* the universe. On the other hand, the human species also seems to us to merit certain distinctions (which in some circles it is fashionable to deny). Significantly, there seems to be in nature a general and cumulative tendency toward self-organization and complexification, and the human brain is for its size the most complex entity we know of. We hasten to add that, in the scale of evolutionary time, the brain is unlikely to be the final epitome of complexification. Nonetheless, if a tendency to increasing complexi-fication were to prove to be embedded in "the way things really are" in this universe, then *the human brain would seem to be a significant exemplar of "the way things really are" at our time in evolutionary history.*

Although the self-organizing tendencies that various theorists are identifying within natural processes can be interpreted as eliminating the need for a God hypothesis, the findings also may point to some hypotheses about the nature of a God who participates in such processes (cf. Ramachandran and Blakeslee 1998, 185). Both kinds of hypotheses rest on fundamental assumptions—faith commitments, if you will—that cannot be proven but only tested for integrity and fruitfulness.

We assert that the nature of the universe reflects in some way the nature of God, of a being really beyond our comprehension that is foundational to it all. This assertion is the foundation of our empirical natural theology, and/or our Gödelian starting point. We think that the human brain (as best we can understand it in our humanizing way) is as good an exemplar of "the way things really are" as we are likely to find at this point in evolutionary history, reasoning from the foundational God to the empirical universe to the complexifying brain. Thus, we are betting that the human brain, flawed but impressive, is as good an image of God as our world can present to us humans now. If so, it may provide some clues to God's nature.

Rottschaefer is correct in his observation that our fundamental assumptions have been shaped by our life experiences within the deep structures of the Judeo-Christian heritage. We, like everybody else, organize information through mental maneuvers that are partly genetic, partly culturally and experientially driven. Either way, these patterns are represented by ingrained pathways in our individual brains, so they actually have a physical basis. In fact, we see these forms of neurological organization—genetically based, influenced by the environment, and individually operated—as the physiological correlate to the postmodern claim that we construct our own reality. Inasmuch as we authors have been nurtured in and through a Judeo-Christian milieu, we as individuals probably lack the complex neural circuitry that would enable us to process and organize information without reference to such thought forms. Try as we might to broaden our experience, we can only know reality through our own particular humanizing brains. We two authors confess that we have not experienced any other symbol system in life-shaping depth, although we respect other systems and have learned something about them. We suggest that no single human being can accurately reflect the depths of many human cultures. We welcome other interpretations from observers shaped through other cultural systems.

Thus, Rottschaefer has indeed identified our assumptive biases and our *modus operandi.* Ours is an attempt to make parts of our Christian tradition in particular, and much of religion in general, sensible, intelligible, and fruitful. We want to engage in conversation that clarifies what we are about and contributes to a wider understanding. To that end we are grateful for Rottschaefer's critique and encouragement of the "fruitful

territory" of the neurosciences for "religious reflection" and our "exploratory boldness."

A Practical Clinician's Pastoral Response. Mary Lynn Dell is trained medically and theologically. Her concern (1999) about *The Humanizing Brain* is pragmatic. She asks, "Will it preach?" and "Does it add to the education of medical personnel?" She reads it as "a secondary text" in exploring process theology or in a pastors' continuing-education group.

Dell sees our account of the brain as overly optimistic. In fact, although we devote several pages to acknowledgment of the hard realities of "sin, evil, moral accountability, and suffering," we decline to add theodicy to the issues that this volume attempts to address in depth.

This is not, in Dell's view, a book for biomedical scientists and physicians because some of its technical descriptions and explanations have been summarized and simplified too much to satisfy this audience. However, it is "a vehicle for dialogue for theologians, scholars, and pastors interested in process theology and the neurosciences." Those interested in a fuller application of the approach to the pastoral situation may consult Ashbrook's 1995 work *Minding the Soul: Pastoral Counseling as Remembering*.

An Affirming Theologian. A long-time participant in the religion-and-science conversation, theologian James S. Nelson (1999) praises the book as presenting the mind-brain as "an icon of God" and pointing to reality as ultimately relational and social. Because of the similarity of Nelson's background to ours, this is not entirely surprising, although it is unexpected.

In her foreword to *The Humanizing Brain,* Anne Harrington claims this exploration "end[s] up posing as many challenges to more traditional Christian assumptions about God as [it does] to more traditional scientific assumptions about humanity." Nelson picks up on the biological basis of religion, particularly the empathy of the limbic system which contributes to the relationality of reality. "There is no way forward in religious discourse that bypasses the world of nature, especially the brain, in making intelligible the reality and nature of God" (Nelson 1999, 50). So Nelson concludes in agreement with us.

Having sketched the three responses, we want to set forth a constructive agenda in the science-and-religion dialogue. In doing so, we are mindful that religionists are more concerned about this than are scientists.

Suggested Guidelines

The Sensibility of Religion. We are making a case for the "sensibility" of religion or divine action. We do this by suggesting that what we are learning about the brain refers to and deals with God and soul in their most generic forms. We describe them through metaphor (basically a right-

brain function) and express thoughts *about* religion and divine action through analogy (a left-brain activity). In both activities, we must allow for the brain's limitations, for it necessarily *humanizes* all that it perceives, understands, and theorizes. Here we *use* our own brain to *view* the generic brain as objectively as we can. Yet, as we have suggested, to theorize about divine action on the basis of brain studies is itself an act of faith. We believe that the brain presents a best-fit exemplar of the reality of which we are a part. We assert that the brain as an empirical anchor can provide clues to the nature of God or divine action as our vision of foundational reality. Yet we have insisted that we are not anthropomorphizing in the usual sense. Obviously, we need to specify the assumptions and methodology that we employ in assaying what we have called a new natural theology in an empirical mode.

No Argument from Design. Natural theology has often been employed to "prove" the existence of God (cf. Barbour 1997). We need to state clearly that that is not our goal. Proponents of the strong anthropic principle—who point to the coincidence of the physical constants of nature with the very requirements for the existence of life on earth, against exceedingly long odds—are today's most convincing proponents of an argument from design; and they may well be right, but their argument is not ours (see Polkinghorne 1991; Ellis 1993). Here we *choose* to believe in the existence of a Ground of Being. Here we are followers of Kurt Gödel, who has shown that, in mathematics at least, the foundational principle of any argument cannot be proven but must be assumed (Hofstadter 1979, 18).

In other words, the issue is not whether the foundational assumption can be *proven.* We think it can only be *chosen*—on the basis of the best criteria that the chooser can marshal. The basic issue in assessing a theological position is *not* whether it can prove the existence of God. Little is gained in arguing about the validity or truthfulness of a theory. Rather, in an approach to theory based on the thinking of theologian Philip Hefner, philosopher of science Imre Lakatos, and religious philosopher Nancey Murphy (Hefner 1993, 23), we assert that a theory suggests a point of view. That point of view has potential for further, systematic elaboration. We ask that our view about how God works be evaluated by its coherence, scope, and fruitfulness (Barbour 1997, 109).

Many Languages of Description. Certainly there are many ways to describe what "is." Each has its own distinct contribution; none has a definitive edge on comprehensiveness. Aldous Huxley argued that we "ought to be able to talk about a mystical experience simultaneously in terms of theology, of psychology, and of biochemistry" (cited in Taylor 1979, 17–19). Like light through a prism, reality refracted through various languages of discourse enables us to understand more fully what we are discovering and discerning (Hofstadter 1997). Perhaps, in the end, the

languages we use are the languages with which we are most comfortable. The assertion of the value of a particular language of discourse may depend more on a personal comfort level than on absolute criteria.

A Dynamic View of Reality. What we *are* about is getting a better view of the *nature* of the Godlike and the humanlike. For us, they are not substantial, demonstrable entities. That is, we do not equate either with any specific physical reality. That would be a literal reductionism, contrary to all that we understand about God, ourselves, and the universe in which we live. In fact, we go even further and observe that *reality itself is not a static entity.* Through a reversal of common assumptions, related to current insights of physics, we see reality as fundamentally a dynamic *process,* a process of differentiating and integrating (Kauffman 1995). This dynamic process occurs at every level of study, from subatomic particles to life forms to the whole cosmos. We believe that divine action is integral to these processes while also, in the language of gestalt psychology, providing their supporting context.

The Self-Evident Dynamic Source of All. In understanding divine action, we align ourselves with the experiential tradition of Saint Augustine. "Where, then," he asked in his *Confessions*, "did I find thee [O God] so as to be able to learn of thee? For thou wast not in my memory before I learned of thee—save in thyself beyond me. *Place there is none.* We go 'backward' and 'forward' and there is no place. *Everywhere and at once*, O Truth" (Augustine [ca. 400] 1955, 224, Bk. 10, Chap. 26, emphasis added).

In a footnote to this reflection, editor and translator Albert Cook Outler added: "When [God] is known at all, God is known as the Self-evident. This is, of course, not a doctrine of innate ideas but rather of the necessity, and reality, of divine illumination as the *dynamic source* of all our knowledge of divine reality" (Augustine [ca. 400] 1955, n. 28, 224).

In developing this assumption of God being the dynamic source of all, Augustine provides a classic expression. He refuses to confuse the parts with the whole, the figure with the ground: "'And what is this God?' I asked the earth, and it answered, 'I am not he'; and everything in the earth made the same confession . . . 'We are not your God.' I asked the whole frame of earth about my God, and it answered, 'I am not he, but he made me'" (Augustine [ca. 400] 1955, 206–7, Bk. 10, Chap. 7).

Here, then, is the basic assumption in understanding God. God is the "self-evident" and "dynamic source" of all reality as experienced and expressed by human beings. There is no place, no entity, no tangible reality that encompasses all that the concept "God" represents. The dynamic differentiating and integrating process is active in every place, in every entity, in every tangible reality, but it transcends tangible reality. The same understanding applies to soul. There is no part, no entity, no tissue that encompasses all that the concept "soul" represents. It can better be

demonstrated through the dynamic interactive trajectory that describes a pilgrimage.

All Holds Together. Even if bodily parts are treated by various medical specialists or isolated for differential analysis, ultimately all goes together. No parts can fulfill their true purpose except by interaction with the rest. And what applies to the body applies to every aspect of life as we know it. (The ecosystem and the effects of human beings—particularly our overconsumption and waste—testify to the fact.) Underlying all that is written here is the assumption of connectedness, of relatedness, of relatability. This same assumption underlies the belief in the repeatability of experiments, which is critical to empirical and experimental investigations.

Modernity—set afire by the sparks struck by Isaac Newton, René Descartes, Gottfried Leibniz, and others—provided great advances in understanding as its disciples analyzed human experience and examined it bit by bit. This kind of research is still widespread and useful. But human understanding has now reached a point where reintegration of knowledge is the order of the day. Whether one is dealing with physics, physiology, or economics, much of the pioneering research is exploring the interrelationship and continual responsiveness of phenomena to one another, as Ursula Goodenough (1998) shows in detail.

Returning to our discussion of the sensibility of religion, we suggest the following: to use the language of the Letter to the Colossians (1:16–18), we believe that "in God all holds together." We describe how that integration is evident in what we know of the universe and of ourselves as part of that universe.

There are many expressions of the integrity of experience. Some are found in the mystical tradition—exemplified, for instance, by Nicholas of Cusa (1401–1464) in the fifteenth century. Nicholas characterized God as that reality that lies beyond the coincidence of opposites (Cusa [ca. 1450] 1928). The assumption of an integrating core to reality is also evident in dialectic views of thesis, antithesis, and synthesis, whether by the Scholastics or the Hegelians. Religion, as that which is the most encompassing referent, embraces all of life. When we talk about God, therefore, we are expressing our experience of the world itself (see Hefner 1993, 88).

The Empirical. In the brain's materiality—its physical matter, its anatomical structures, its biochemical processes—we see the most empirical anchor of intentionality or what many take as higher-order consciousness. Intentionality involves learning and memory, anticipating and evaluating, consciousness of being conscious, all rooted in the brain. The brain's empirical nature does not make it a computer, or the world "a piece of computer tape." However, the brain's materiality does enable us to take "intentionality into the picture" of brain function, as neuroscientist and Nobel laureate Gerald M. Edelman argues (1992, 68, 112). For as another

Nobelist, Roger Sperry (1992), has theorized, the brain is constructed to operate both bottom-up and top-down—in response to its cellular structure and chemical environment on the one hand, and to the traces encoding its values and priorities on the other. Both are involved in our emotions, calculations, and decisions.

The Experiential. At the same time, in the brain's cognitive representations—its perceptual processes and pattern making, its imaginative constructing and symbolizing—the mind presents the most experiential source of meaning making. Our mind-brain is where we experience the "real" on many levels, including what we perceive to be experience of self, world, and God. Further, in the integrating core of the old cortex—the limbic system—the brain balances what is novel and creative with what is necessary and adaptive. And the still older brain—which we share with reptiles—propels us toward behaviors necessary to sustain this materiality. These behaviors involve food seeking, safety seeking, and mate seeking.

We are made to create our niche in a universe not of our own making. We live in a reality in which "all holds together." And, we are even co-creators of the social and cognitive structures that hold all together for us (Hefner 1994).

The assumption of the integrity of reality may be most explicit in a dynamic monotheism that affirms the oneness of God. In this affirmation, though, we want explicitly to exclude two possible unintended connotations: one about exclusivism, and the other about patriarchalism.

Unintended Connotations. The exclusivist connotation assumes that one's position is the only viable position and that one's definition of God is the only way that God can be understood. That results in a religious imperialism alien to our intent. The patriarchal connotation is contained in the Apostles' Creed's expression of belief "in God the Father Almighty, maker of heaven and earth." Feminist thinkers attack such a hierarchical view of reality (Ruether 1983; McFague 1982; 1987). Efforts to speak of "Mother God," although also ambiguous, are designed to offset the negativity latent in "Father God." Despite our own spiritual formation within the Judeo-Christian tradition, we reject knee-jerk religious exclusivism and patriarchy. We are drawn to an understanding of God as process, as whole-making, or, better yet, as the dynamic integrity of reality. This view is analogous to those expressed by scientists who see "mind . . . [as] a process, not stuff" (Edelman 1992, 6–7) or by mathematicians whose descriptions usually focus on interaction.

Certainly the human mind necessarily humanizes any understanding that we may have of God. We can only conceptualize with the apparatus we have in our head, and our thought forms come to us through human cultures. Necessarily, any resemblance between our concepts and the reality of a God is, at most, approximate. Furthermore, as thinkers from Søren

Kierkegaard to Jean-Paul Sartre to Kurt Gödel have reminded us, each in his own way, the starting point for our concept construction must be chosen by us—on the basis of the best available evidence, to be sure, but with no wonderfully irrefutable evidence. We therefore do not even attempt to use our observations about the brain or anything else as a *proof* of God. At most they suggest that a God who represents a dynamic integrity of reality has certain characteristics, which we human beings can understand in human ways. And, circling back to our personal concerns, we can then make some further conjectures about the place of humans in the scheme of things.

These points about our God concept need to be emphasized, simply because people do have their own concepts of God—whether they finally accept or reject theism—and they may erroneously project such concepts into this discussion as they judge the credibility of what we are saying here.

God's Freedom and Ours. A God who expresses "the dynamic integrity of reality" expresses a lot, not all of which we regard as good or desirable. Here we encounter the problem of theodicy, as Dell and others have observed. A conventional view of theodicy is expressed by Archibald MacLeish in his play *JB:* "If God is God He is not good,/If God is good He is not God;/Take the even, take the odd" (MacLeish 1958, 11). This is certainly true if we assume an actively omnipotent God—a concept that seems to form an unquestioned part of many assumptions about God's nature among both theists and nontheists. However, if we take the somewhat unexpected step of denying that active omnipotence must be a distinguishing trait of God, we put a different spin on this age-old conundrum, although we do not solve it.

We align ourselves with those who emphasize God's *participation* in the world. This emphasis assumes reality as an open system. It looks to the future more than to the past. There is no dualistic cleavage between God and world. Nor is the world—including humanity—merely passive and receptive. Instead, God and world form, in the words of theologian Gordon D. Kaufman, an "intradependent whole, an evolutionary ecosystem in which all parts develop in complex interrelationship with one another" (Kaufman 1993, 271). They act and interact.

Is and Ought. Assume, then, that much of what happens in our universe is an open question, subject both to chance and to choice—our own and others'. This assumption then raises the is/ought question, which Hefner has explored with particular cogency (1981; 1993). In biblical-theological terms it is the relation between the alpha of the beginning and the omega of fulfillment. Is destiny determined by origin? Is destiny only the extension and elaboration of origin? Or, as asserted here, do people have some real choices?

Hefner supports the latter option but explores the relatedness of "is" and "ought."

> Humans experience freedom *as for the sake* of something, and that "something" is the best possible actualization of what they *ought* to become. Humans search the *is* of the determined context, in order to discover its *ought*; just as they probe its *ought* in order to discover its *is*. In other words, freedom seeks the end or purpose or fundamental nature of the life process in which it finds itself, in order to be obedient to what fundamental nature can become. This is another facet of the innate human drive to discover the way things really are and to shape human behavior commensurately. (Hefner 1993, 115)

Such a dynamic view of reality avoids the absurdity of maintaining that everything that *is* expresses the way everything *ought to be.* In personal terms, an open view of reality transforms inevitable "fate" into meaningful "calling."

In the Bible, God is most clearly characterized as "The Elusive Presence," to use the phrase of Old Testament theologian Samuel Terrien ([1978] 1983). Feminist theologian Carter Hayward speaks of "The Enigmatic God"—God "is not one to be pinned down, boxed into categories and expectations! God will be what God will be" (Hayward 1982), and that includes conditions that can in no way be anticipated. Such a conviction of openness leads to a sense of our own participation in the formation of the future. We do not live in a cast-iron inevitability in which human intentionality plays no part. Certainly evil exists; if we argue for a subtle but ultimately controlling designer-God, we are left with MacLeish's insoluble theodicy problem and with only illusory human dignity. In a more open, contingent system there are human error and intentional evil as well as natural suffering, but there is also room for humans to grow toward maturity.

Complexity. An open, contingent system apparently tends to steadily increase its own complexity all on its own. By *complex* we do not mean merely complicated. A rough definition of *complexification,* as used here, would allude to a system with an increasing number of meaningful connections among and between its elements; that is, with increasing useful organization. The system would combine elements of order, openness, and disorder.

Theorists actively dispute why complexification may be going on. Some, for example, argue that life forms have become more complex by default, so to speak. The early, simple forms, such as protozoa, could not get much simpler and still be alive. Random variation, therefore, could move in only one direction—toward increasing complexity.

Others, such as Stuart Kauffman, maintain that the perceived trend toward complexification in organisms is more than a forced choice. Instead, the process is the necessary consequence when organisms interact and replicate in conditions necessary to life. Interaction leads to the formation of meaningful and active connections, which have survival value and which lead to increased complexity. One hallmark of this dynamic process is that

it takes place in situations where there is both order (or predictability) and chaos (or contingency) (Kauffman 1995). In the March 1999 issue of *Zygon,* besides the three articles in response to *The Humanizing Brain,* there are three responding to Niels Henrik Gregersen's September 1998 *Zygon* article on creation and self-organization, followed by a response from Gregersen. These articles unpack some of these issues in detail not provided here.

Whichever view of complexification one accepts, the trend seems increasingly clear. And the human brain serves as an exemplar of complexity—for its size, the most complex entity that we know of in the universe. This is not to say that all of evolutionary history has taken place for the *purpose* of producing the human brain. The evidence may, however, indicate that we humans are, after all, of greater worth than a speck of cosmic dust in a virtually endless universe—audacious as that claim may seem in the face of the bravely masked anomie of our time. Although continued complexification may eventually produce life forms that far surpass human beings in complexity, *Homo sapiens sapiens* may represent a sort of "way station" in time, and the decisions we make are likely to have some impact on outcomes far into the future.

Methodology

These assumptions have methodological implications. However, the distinction between assumptions and methodology is somewhat arbitrary, because the two are intertwined. And methodologies themselves are commingled and simultaneous in expression, even though we spell them out in a sequential manner.

Defining Particulars and Searching for Meaning. In this article we have paid particular attention to some important research dealing with nonlinear and/or wholistic systems, including chaotic systems and self-organizing complex systems. Characteristically, though, scientific research emphasizes particular differences and seeks explanations of causality in terms of physical linearity or necessary consequences. This applies to research in the neurosciences as well as other areas. This search for defining particulars is the "bread and butter" of scientific research. Historian of science Anne Harrington has identified this particularity as "respectable" science in contrast to "real" science (personal communication 1997). Respectable science confines itself to the confinable; real science explores all that is.

Religion, whether understood in broad cultural terms or in more narrow theological categories, reflects a search for meaning and unity, for wholeness and relatedness. Meaning refers to the order of psychic significance or "an ultimate structure in reality," to draw on the distinctions philosopher of science Holmes Rolston makes (1987, 1–32).

Three convictions frame Rolston's analysis of the relation between the search for causality and differences and the search for unity and meaning: (1) what is highest in value is deepest in nature; (2) the human mind "fits" with natural processes; and (3) what is meaningful follows understandable patterns. The biological information carried by the complexity of molecules contains vital information about life as a whole. As Rolston writes, "The whole organic program is inlaid into nearly every cell. . . . The whole secret perfuses all the parts, but the secret is a secret of the whole, not of any mere part, even if it is stored in all the parts" (Rolston 1987, 85).

In the interchange between "real" science and ultimate concern, we seek to discover ourselves and our God.

Weaving a Whole. The great neurophysiologist Sir Charles Scott Sherrington is an example of someone from the realm of science who held together the objectivity of causality and the subjectivity of meaning (Thines 1987). He described the brain as "an enchanted loom where millions of flashing shuttles weave a dissolving pattern, always a meaningful pattern though never an abiding one; a shifting harmony of subpatterns" (Sherrington 1941). His understanding of the integrative character of the nervous system did away with classical dualism even as it reflected an open and dynamic quality to the functioning brain.

Cognition, or consciousness, connects neuronal activity and cultural influences by mapping mental representations resulting from biochemical processes, following patterns partly derived from culture. Schemata are derived from the rational interpretation of the dominant hemisphere; images are generated by the relational impressions of the nondominant hemisphere. Drives and sensations as well as memories feed into the mix. From it all, mind creates a cosmos, an orderly and ordering world of meaning.

The mind does not "mirror" an objective reality. Rather, the mind combines visceral and subsymbolic processing to construct a physical environment and to create a human world. It includes values and purposes, transcendent assertions and aspirations in what the brain is and how the brain works. Sherrington waxed eloquent on this point: What does that "invisible, intangible . . . not a 'thing' . . . amount to?" he asked—and he answered, "All that counts in life. Desire, zest, truth, love, knowledge, 'values,' and, seeking metaphor to eke out expression, hell's depth and heaven's utmost height" (Sherrington 1941, 357). These features of cognition and commitment reflect the universe in which we live and our interpretations of that universe. Cognition, thereby, consists of an experiential realism.

In our insistence on wholism, we contradict some thought forms that are well ingrained in our culture. As Anne Harrington has pointed out, there has long been a struggle between analytic and wholistic ways of understanding the mind and the world (Harrington 1996). Each "side"

has been suspicious of the other, the proponents of analysis accusing wholists of muddleheadedness, superstition, and worse; the wholists calling the analysts opponents of community and human values, cold-hearted and detached. In fact, we believe that analytic thinking has enabled great feats of problem solving, and yet it is also true that the world really is all of a piece. True, many problems can best be solved by analyzing component parts, yet matter apparently follows the same physical laws throughout time and space. From the incredible spaciousness of the universe to the unimaginable minuteness of the subatomic particle, all is related.

A Theological Risk. Because of this profound relatedness, and because the human mind seems to epitomize the trend toward complexification that apparently characterizes cosmic history, we have dared to take an important risk. We have suggested that the human mind, in its constitution and operation, is of a piece with the cosmos. Reasoning from the nature of the mind, we believe we can draw some conclusions about the rest. It can provide us with important information regarding what the world is about. This is a religious question, and so we assert that the nature of the mind can point in some ways to religious truth, and even to the nature of the deity. We propose for consideration Emily Dickinson's observation, "The Brain is just the weight of God" (Dickinson 1983, poem 732).

We append to this bold move three caveats: (1) The mind may reveal knowledge about the world and God, but the mind also limits knowledge. For we can only know what the mind can process, and in its processing, as we have seen, the mind humanizes knowledge. (2) There is a fine but crucial distinction between projecting the "good parts" of human nature on to a postulated God—classical anthropomorphizing—and postulating that the mind could be the basis for drawing some conclusions about the nature of the reality within which the brain evolved, where it has proven fit, and whence its future presumably lies. (3) Similarly, there is a critical difference between arguing that, because the mind is so marvelous, it must have had a designer (the argument from design) and arguing that God and the universe are intertwined in continual interaction, and so the nature of the temporal order, epitomized so far by the human mind, may provide clues to God's nature as well.

In order for the latter two claims to make sense, one must first postulate that the universe has an underlying Ground of Being that can be characterized as God. One need not preassign to this God any particular attributes such as omnipotence, goodness, and omniscience. (In fact, it seems clear to us that any conclusions we human beings reach about this God are bound to be humanized, our limitations being what they are.) Whatever we learn will be part of an interactive process with this elusive Presence.

Seeking Integrity. We have never accepted as absolute such splits as causal-explanatory versus experiential-meaningful. For us, like many others, such contrasts always seem to distort a deeper reality—in the universe, in ourselves, in God. The finite and the infinite, to refer to philosophical concepts, could be one, whole, inseparable, nonpolarized. The locus of the holy could lie within, even as the reaches of the holy open outward.

Study of how the brain works is showing that even though mind-brain is made up of at least three levels—the instinctual reptilian mind, the emotional mammalian mind, and the rational neocortical mind with its frontal lobes and two distinguishable hemispheres—the levels are not so much separate entities as necessary aspects of the functioning whole (MacLean 1990). That idea abolishes dualism and points to the integration of differentiation. Ian Barbour puts it this way:

> . . . process philosophy is supportive of the biblical view— . . . consistent with the evidence from the neurosciences—that a human being is a multilevel *unity*, an embodied social self, a responsible agent with capacities for reason and emotion. But neither science nor philosophy—even when supplemented by data from the humanities and social sciences—can capture the full range of human experience or articulate the possibilities for the transformation of human life to which our religious traditions testify. (Barbour 1998, 25)

We are trying to suggest how God—the reality of God and people's perception of God—might be meaningful in human experience. Even if God is not a demonstrable entity, we can explore the plausibility, the sensibility, the comprehensibility of that to which the word *God* refers.

For us, the brain and its processes represent and reflect the integrity of reality. We are embedded in an evolving, complexifying universe that potentially may serve as a matrix for our becoming grace-full human beings. This involves an affirmation that, as Hefner argues, nature can truly be our friend: despite issues of death and natural selection, sin and fallenness, "nature can be a bearer of transcendence [and] can contain the possibility of grace" (Hefner 1994, 525).

We hold together an evolutionary understanding of the brain and a developmental understanding of the mind. Evolutionary data describe the givens of our genetic inheritances; developmental data discern the reaches of our cultural inheritances. In the interaction, the mind-brain comes into being, and the humanizing brain creates—gives birth to—what we call reality. Our constructed reality is always emerging, even as God's reality is always emerging. In the theological imagery of eschatology, this reality is bringing us into "a deep solidarity with the whole suffering Creation" (Moltmann 1990, 362).

Conclusion

In this discussion we have tried to be explicit about what we assume in this meeting between neuroscience and religion. We have sought to explicate

the way in which we go about this correlation of distinct realms of discourse and exploration. We have contended that the dynamic source of all that exists is God. As such, this reality reflects both differentiating and integrating processes. These two processes are present in every aspect of the universe and are especially apparent to us in our human universe. Every dimension is related to every other dimension. This is true, at the very least, in terms of the humanizing brain. Everything is relatable in a meaning-making way because we live in an open system. We try to minimize an abstract search for "validity" or "truth." Instead, we find coherence, scope, and fruitfulness as criteria for the value of various points of view.

As the humanizing brain may study itself to learn about its own operating procedures, so we here have examined the ways in which our work has attempted a "new natural theology in an evolutionary mode." Our methodology partakes of all of Barbour's four categories of science-religion interaction—conflict, independence, dialogue, and integration (Barbour 1997, 77)—but exemplifies none of them. As the mind *is* emergent and *gives rise to* emergent phenomena, so perhaps our attempts at analogy and metaphor, analysis and wholism, science and religion, may lead to some emergent understandings and dialogical delineation of the processes of mind-and-faith.

References

Abba, R. 1962. "Name." In *The Interpreter's Dictionary of the Bible: K–Q*, gen. ed. George Arthur Buttrick, 500–508. Nashville: Abingdon.

Albright, Carol R. 1996. "Zygon's 1996 Expedition into Neuroscience and Religion." *Zygon: Journal of Religion and Science* 31 (December): 711–27.

Ashbrook, James B. 1984a. "Neurotheology: The Working Brain and the Work of Theology." *Zygon: Journal of Religion and Science* 19 (September): 331–50.

———. 1984b. *The Human Mind and the Mind of God: Theological Promise in Brain Research.* Lanham, Md.: University Press of America.

———. 1988. *The Brain and Belief: Faith in Light of Brain Research.* Bristol, Ind.: Wyndham Hall Press.

———. 1995. *Minding the Soul: Pastoral Counseling as Remembering.* Minneapolis: Fortress.

———. 1997. "'Mind' as Humanizing the Brain: Toward a Neurobiology of Meaning." *Zygon: Journal of Religion and Science* 32 (September): 301–20.

Ashbrook, James B., and Carol Rausch Albright. 1997. *The Humanizing Brain: Where Religion and Neuroscience Meet*. Cleveland, Ohio: Pilgrim Press.

———. 1999. "*The Humanizing Brain*: An Introduction." *Zygon: Journal of Religion and Science* 34 (March): 7–43.

Augustine, Saint. [ca. 400] 1955. *Confessions and Enchiridion.* Trans. and ed. Albert Cook Outler. Philadelphia: Westminster.

Barbour, Ian G. 1990. *Religion in an Age of Science: The Gifford Lectures, Volume One.* San Francisco: HarperSanFrancisco.

———. 1997. *Religion and Science: Historical and Contemporary Issues.* San Francisco: HarperSanFrancisco.

———. 1998. "Neuroscience, Artificial Intelligence, and Human Nature: Theological and Philosophical Reflections." Paper presented at the CTNS/Vatican Observatory Conference on Neuroscience and the Mind/Body Problem. Cracow, Poland, June 1998. A revised version is printed in this issue of *Zygon* (pp. 361–98).

Brun, Rudolf B. 1999. "Does God Play Dice? A Response to Niels H. Gregersen, 'The Idea of Creation and the Theory of Autopoietic Processes.'" *Zygon: Journal of Religion and Science* 34 (March): 93–100.
Burrell, David B. 1973. *Analogy and Philosophical Language*. New Haven: Yale Univ. Press.
———. 1982. "Argument in Theology: Analogy and Narrative." In *New Dimensions in Philosophical Theology*, ed. Carl A. Raschke, *Journal of the American Academy of Religious Studies* 49, no. 1:37–52.
Cacioppo, John T. 1992. "Social Psychological Contributions to the Decade of the Brain." *American Psychologist* 47, no. 8 (August): 1019–28.
Cacioppo, John T., and Gary G. Berntson. 1992. "The Principles of Multiple, Nonadditive, and Reciprocal Determinism: Implications for Social Psychological Research and Levels of Analysis." In *The Social Psychology of Mental Health: Basic Mechanisms and Applications*, ed. Diane N. Ruble, Philip R. Costanzo, and Mary Ellen Oliveri, 328–49. New York: The Guilford Press.
Cacioppo, John T., Gary G. Berntson, and Louis G. Tassinary. 1990. "Inferring Psychological Significance from Physiological Signals." *American Psychologist* 45, no. 1 (January): 16–28.
Capra, Fritjof, and David Steindl-Rast, with Thomas Matus. 1991. *Belonging to the Universe: Explorations on the Frontiers of Science and Spirituality*. San Francisco: HarperSanFrancisco.
Cusa, Nicholas of. [ca. 1450] 1928. *The Vision of God*, trans. Emma Gurney Salter, with intro. by Evelyn Underhill. New York: Dutton.
Damasio, Antonio. 1994. *Descartes' Error: Emotion, Reason, and the Human Brain.* New York: G. P. Putnam's Sons.
Deacon, Terrence W. 1997. *The Symbolic Species: The Co-evolution of Language and the Brain.* New York: W. W. Norton.
Dell, Mary Lynn. 1999. *"The Humanizing Brain:* A Clinician/Pastor Response." *Zygon: Journal of Religion and Science* 34 (March): 51–55.
Dickinson, Emily. 1983. *The Poems of Emily Dickinson,* ed. Thomas H. Johnson. Cambridge: Harvard Univ. Press, Belknap Press.
Edelman, Gerald M. 1992. *Bright Air, Brilliant Fire: On the Matter of the Mind*. New York: Basic Books.
Ellis, G. F. R. 1993. "The Theology of the Anthropic Principle." In *Quantum Cosmology and the Laws of Nature: Scientific Perspectives on Divine Action,* ed. Robert John Russell, Nancey Murphy, and C. J. Isham. Vatican City State: Vatican Observatory Publications, and Berkeley, Calif.: Center for Theology and the Natural Sciences.
Feuerbach, Ludwig. [1845] 1957. *The Essence of Christianity,* ed. and abridged by E. Graham Waring and F. W. Strothman. New York: Frederick Ungar. First published in 1841 as *Das Wesen des Christentums.*
Fleming, William. 1974. *Arts and Ideas.* New, brief ed. New York: Holt, Rinehart and Winston.
Gilkey, Langdon. 1999. "Gregersen's Vision of a Theonomous Universe." *Zygon: Journal of Religion and Science* 34 (March): 111–15.
Gödel, Kurt. [1931] 1962. *On Formally Undecidable Propositions.* New York: Basic Books. First published in 1931 as "Über Formal Unentscheidbure Sätze der *Principia Mathematica* und Verwandte Systeme. I." *Monatshefte für Mathematik und Physik* 38: 173–98.
Goodenough, Ursula. 1998. *The Sacred Depths of Nature.* New York: Oxford Univ. Press.
Gregersen, Niels Henrik. 1998. "The Idea of Creation and the Theory of Autopoietic Processes." *Zygon: Journal of Religion and Science* 33 (September): 333–67.
———. 1999. "Autopoiesis: Less than Self-Constitution, More than Self-Organization: Reply to Gilkey, McClelland and Deltete, and Brun." *Zygon: Journal of Religion and Science* 34 (March): 117–38.
Harrington, Anne. 1996. *Reenchanted Science: Holism in German Culture from Wilhelm II to Hitler*. Princeton, N.J.: Princeton Univ. Press.
———. 1997. Personal communication to James B. Ashbrook, Sept. 13.

Hayward, Carter. 1982. *Redemption of God.* Washington, D.C.: University Press of America.
Hefner, Philip. 1981. "Is/Ought: A Risky Relationship between Theology and Science." In *The Sciences and Theology in the Twentieth Century,* ed. A. R. Peacocke, 58–78. Notre Dame, Ind.: Univ. of Notre Dame Press.
———. 1993. *The Human Factor: Evolution, Culture, and Religion.* Foreword by Arthur Peacocke. Minneapolis: Fortress.
———. 1994. "Can Nature Truly Be Our Friend?" *Zygon: Journal of Religion and Science* 29 (December): 507–28.
Hofstadter, Douglas R. 1979. *Gödel, Escher, Bach.* New York: Basic Books.
———. 1997. *Le Ton beau de Marot.* New York: Basic Books.
Johnson, Mark. 1987. *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago: Univ. of Chicago Press.
Kauffman, Stuart. 1995. *At Home in the Universe: The Search for Laws of Self-Organization and Complexity.* New York: Oxford Univ. Press.
Kaufman, Gordon D. 1993. *In Face of Mystery: A Constructive Theology*. Cambridge: Harvard Univ. Press.
Kelsey, D. H. 1983. "Method, Theological." In *The Westminster Dictionary of Christian Theology*, ed. Alan Richardson and John Bowden, 363–68. Philadelphia: Westminster.
Kolb, Bryan, and Ian Q. Whishaw. [1980] 1985. *Fundamentals of Human Neuropsychology*. 2d ed. New York: W. H. Freeman.
Lakoff, George. 1987. *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind.* Chicago: Univ. of Chicago Press.
Luria, Aleksandr Romanovich. 1987. "Reductionism in Psychology." In *The Oxford Companion to The Mind,* ed. Richard L. Gregory, with O. L. Zangwell, 675–76. New York: Oxford Univ. Press.
MacLean, Paul D. 1990. *The Triune Brain in Evolution: Role in Paleocerebral Functions.* New York: Plenum.
MacLeish, Archibald. 1958. *JB: A Play in Verse.* Cambridge, Mass.: Riverside Press.
McFague, Sallie. 1982. *Metaphorical Theology: Models of God in Religious Language.* Philadelphia: Fortress.
———. 1987. *Models of God: Theology for an Ecological, Nuclear Age*. Philadelphia: Fortress.
Moltmann, J. 1990. "Eschatology and Pastoral Care." In *Dictionary of Pastoral Care and Counseling,* gen. ed. Rodney J. Hunter, 360–62. Nashville: Abingdon.
Nelson, James S. 1999. "The Human Meaning of the Brain." *Zygon: Journal of Religion and Science* 34 (March): 45–50.
Nicholas of Cusa. *See* Cusa, Nicholas of.
Pannenberg, Wolfhart. 1993. *Toward a Theology of Nature: Essays on Science and Faith*, ed. Ted Peters. Louisville: Westminster/John Knox.
Peacocke, Arthur. 1991. "God's Action in the Real World." *Zygon: Journal of Religion and Science* 26 (December): 455–76.
Polkinghorne, John. 1991. *Reason and Reality: The Relationship between Science and Theology.* Valley Forge, Pa.: Trinity Press International.
Ramachandran, V. S., and Sandra Blakeslee. 1998. *Phantoms in the Brain: Probing the Mysteries of the Human Mind.* New York: William Morrow.
Rolston, Holmes, III. 1987. *Science and Religion: A Critical Survey*. New York: Random House.
Rottschaefer, William A. 1999. "The Image of God of Neurotheology: Reflections of Culturally Based Religious Commitments or Evolutionarily Based Neuroscientific Theories?" *Zygon: Journal of Religion and Science* 34 (March): 57–65.
Ruether, Rosemary Radford. 1983. *Sexism and God-Talk: Toward a Feminist Theology*. Boston: Beacon Press.
Russell, Robert John, Nancey Murphy, and C. J. Isham, eds. 1993. *Quantum Cosmology and the Laws of Nature: Scientific Perspectives on Divine Action.* Vatican City State: Vatican Observatory Publications, and Berkeley: Center for Theology and the Natural Sciences.

Sherrington, Sir Charles Scott. 1941. *Man on His Nature: The Gifford Lectures 1937–1938.* New York: Macmillan.
Sperry, Roger W. 1992. "Paradigms of Belief, Theory and Metatheory." *Zygon: Journal of Religion and Science* 26 (June): 237–48.
Springer, Sally P., and Georg Deutsch. [1981] 1989. *Left Brain, Right Brain.* 3d ed. New York: W. H. Freeman.
Taylor, Gordon Rattray. 1979. *The Natural History of the Mind.* New York: E. P. Dutton.
Terrien, Samuel. 1978. *The Elusive Presence: The Heart of Biblical Theology*. San Francisco: Harper and Row.
Thines, Georges. 1987. "Sherrington, Sir Charles Scott." In *The Oxford Companion to the Mind,* ed. Richard Gregory, 711–13. New York: Oxford Univ. Press.
Tillich, Paul. 1951. *Systematic Theology*. Vol. 1: *Reason and Revelation, Being and God.* Chicago: Univ. of Chicago Press.
———. 1959. *Theology of Culture*, ed. Robert C. Kimball. New York: Oxford Univ. Press.
———. 1963. *Systematic Theology*. Vol. 3: *Life and the Spirit; History and the Kingdom of God*. Chicago: Univ. of Chicago Press.
———. 1968. *A History of Christian Thought,* ed. Carl E. Braaten. London: SCM Press.