FROM BIOGENETIC STRUCTURALISM TO MATURE CONTEMPLATION TO PROPHETIC CONSCIOUSNESS

by James B. Ashbrook

Abstract. The publication of *Brain, Symbol & Experience* by Charles D. Laughlin, Jr., John McManus, and Eugene G. d'Aquili marks a significant advance in their biogenetic structural theory. They set forth a neurophenomenology of human consciousness and mature contemplation. A question is raised about their espousal of pristine perception, while their emphasis on polyphasic awareness is appreciated. In their contribution to interdisciplinary dialogue, limitations of gender, neglect of the religious traditions of the West, and linguistic issues are explored. While the style is difficult, the volume promises to become a classic in affirming "the human brain as the main locus of causality."

Keywords: biogenetic structuralism; consciousness; contemplation; linguistics; neurophenomenology; symbolic process.

In *Brain, Symbol & Experience: Toward a Neurophenomenology of Human Consciousness* (1990), Charles D. Laughlin, Jr., John McManus, and Eugene G. d'Aquili present a holistic model of human experience, which, they say, we construct through the interplay between experience and action. For full awareness of reality, they argue (p. 227), one needs sophisticated introspection as well as normal consciousness.

They call their inquiry a search for "a neurophenomenology of human consciousness." This phrase refers to the neural structures that make us conscious of "things in themselves." To attain this knowledge, sophisticated introspection is as basic as objectified science. Only such human science can resolve questions that elude strict experimentation. For only human science deals with "the primal urge to know," what they refer to as "the *cognitive imperative*"

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(pp. xi–xii, 166, italics in original), and only human science provides a way to examine conscious phenomenology. In advocating this view, they present "a framework for cross-cultural comparison and scientific theory construction" (p. 297).

BACKGROUND

In the early seventies, these authors proposed an alternative to orthodox anthropology. At that time, anthropology was a semiotic interpretive science. They shifted to a structural and cultural approach. They named their position—and their book—*Biogenetic Structuralism* (1974). The conventional approach moved deductively from sociocultural-linguistic considerations back to structures of mind and brain. In contrast, these theorists alternated inductively and deductively between brain and behavior. Theirs was a dialectic between the brain as thesis and the environment as antithesis.

For them, cultures developed in tandem with the activity of simpler evolutionary elements in the nervous system of mammals, including human beings. They termed these elements *neurognostic*. Neurognostic organization of the neural network provides a basis for the universal features of mind and, therefore, for culture (1974, ch. 5).

They regarded their efforts as suggestive. They were learning to ask questions and "perhaps, demonstrate a few appropriate answers." Yet they claimed theirs was "a *comprehensive theory* derived from insights of the neurological sciences, cognitive psychology, linguistics, human paleontology, and social-cultural anthropology" (1974, 14, italics added). This was no modest undertaking.

They meant *Biogenetic Structuralism* to be "only the first word" in explaining cultural patterns on the basis of neurocognitive origins. While "not . . . the last word," the book refocused cross-disciplinary activity. An initial "lack of interest" in their approach (p. xii) changed with advances in the neurosciences.

In *The Spectrum of Ritual* (d'Aquili, Laughlin, and McManus 1979), they applied their theory to ritual as a " 'universal' cultural institution" (p. xiii). Because of its concrete focus, the work remains pivotal. Barbara W. Lex's chapter, "The Neurobiology of Ritual Trance," is classic. In it she argues that ritual readjusts out-of-phase biological and social rhythms by careful manipulation of neurophysiological structures. Stress is alleviated. Right hemisphere dominance is permitted. This promotes "a feeling of well-being and relief." Further, ritual synchronizes cortical rhythms in the hemispheres and evokes the rebound of adaptive arousal (d'Aquili, Laughlin, and McManus 1979, 144–45).

These earlier volumes argued for an evolutionary and biological anchoring of universals. Structured to adapt, the brain constructs models of the environment. These models moderate among sensory input, other models available in the nervous system, and the organism's response. Based on "the *cognitive imperative,*" the models are modified by negative and positive feedback for the purpose of optimum adaptation (pp. 59–61). With their work "sufficiently matured," as they characterize it (p. xii), they now move directly into consciousness itself. Earlier hypotheses are bolstered by more data and enhanced theory.

Current Position

This current work does mark significant maturing in the three authors' theorizing. Our nervous system links what we sense with what we symbolize. The authors spell out that neurocognitive connection more fully. The perceptual sensory field and the intentional symbolic field are intertwined. This relationship creates a frame of meaning-making. That frame accounts for our experiences of both integration and fragmentation (p. 234).

Meaning-making implies "a viable cosmology," and a cosmology must be constructed from experience-based metaphors (p. 233). The metaphors originate in the neurognostic sphere, they say. Their examination of the process is a major contribution to multidisciplinary research, knowledge, and interpretation.

They use explanations, figures, and references to make sense of "the fundamental structure of experience"—the holistic (or fragmented) result of the interaction of mind and environment (p. 237). In fact, every experience "is generated by neural organizations . . . influenced by the evolution of the species, the development of the individual, and the forces of social conditioning" (p. 337). Although acknowledging the impact of culture, they insist upon the neural origin of culture itself.

Their thesis is straightforward. "[T]he central role of the symbolic process [lies] in neural organization and experience" (p. 159). To avoid dualism they assume the unitary perspective of structural monism. This view holds that "spiritual" and "physical" awareness are "two imperfect ways of perceiving and knowing the same unknown totality we may call 'being' " (p. 11). Events, perception, cognition, and action are "interdependent aspects of a single whole" (p. 162). The symbolic process depends on activity in the world (p. 174). Without action there is no cognition (p. 160). Thus, in

an understanding of culture, ritual is more basic than myth (pp. 160–62).

The authors draw heavily upon their "own contemplative experiences." Their position is Abelardian in that it moves "from doubt to belief." Yet it is Augustinian-Anselmian because it reflects faith seeking understanding, for action includes contemplative experiences. These experiences are supplemented by data about neural structures and behavior associated with those structures (p. xiv). However, contemplation is the most mature form of consciousness.

The authors have organized their explanation into three sections: the Structures of Consciousness, the Symbolic Process, and the Limits of Experience.

Part One: The Structures of Consciousness. Laughlin, McManus, and d'Aquili make a case for mature contemplation or trained introspection. This is the mode of inquiry appropriate to phenomenology. Yet they use both neurological and phenomenological terms, since they see brain and consciousness as two sides of the same coin (p. xv). Together, brain and mind spell out the structure of experience. This unitary structure is based on neurognosis: "the initial organization of a neural network" which "accounts for universal attributes of mind" and culture (p. 44).

Basing their theory on metaphoric and analytic descriptions of consciousness, they identify "the *primacy of the cognized environment*" (p. 84, italics in original). We live less in terms of reality itself and more according to our models of reality. Furthermore, what we do is always transforming our neural organization. The crucial areas in consciousness are "the intentional processes in the prefrontal cortex" (pp. 93–94). Here goals and plans, memories and anticipations, information from the body and the world are synthesized. The "polar dialogue" between symbolic intention and the sensorium mediates consciousness (pp. 102–19).

This position is subtle and warrants restating. Brain and mind are two views of the same reality. The brain structures the mind, while the mind is the brain experiencing its own activity (p. 13). Mental phenomena (like dreams and percepts) and physical phenomena (like breathing and reflexes) are opposite sides of the same coin. Despite the dualism that language presents, the authors strive for "a unified view." Such a view has two results. On the one hand, it creates distinct conceptual domains; on the other, it bridges those domains conceptually (p. xv).

Part Two: The Symbolic Process. The symbolic process has raised "intractable problems" for interpretive studies. Those include "the locus of intentionality, the relationship between symbol and action, the archetypal origins of symbols, the relationship between ego-awareness and unconscious symbolism. . . and the understanding of cultures as symbolic systems" (p. 159). The authors examine the neural organization underlying symbolic experience in order to address these issues. Cognition and action go together (pp. 160–62). Beyond this, "the relationship between symbol and meaning is one of part to the whole" (p. 163).

The authors discuss pattern-detection and play in order to describe the evolution of symbolism. While earlier species may have used *perception* as frame, for humans today the frame is *intention* (p. 183). What we perceive depends on what we intend. And what we intend combines both our own freedom and the built-in bias of social adaptation (p. 189).

These processes culminate in the "Theater of Mind." Myth, ritual, and shamanic activity express "the cycle of meaning." That cycle of meaning makes a culture's cosmology real (pp. 227–33). The symbolic process forms a canal or pathway of change which carries a culture's meaning. These meanings are dramatizations of experience. The authors illustrate them by describing the Tukano Indians in the rain forests of the Amazon (pp. 217–19), the Dogon in West Africa (pp. 219–23), and the Buddhist mandala or cosmic circle (pp. 223–25). Such canalizing of meaning limits experience to the beliefs of the culture. At the same time the canalizing transcends those limits by experience which is more direct than vicarious (pp. 227–31).

Part Three: The Limits of Experience. Drawing heavily on Jean Piaget, the authors portray the ego as a complex process, not a fixed entity. Ego is "biological in nature, symbolic in content, and adaptive in function." By processing "symbolic material," the ego "generates experience" (p. 245). The structure of the ego, thereby, is an emergent process (p. 244).

To map the emergence of the ego, they link such disparate components as dreaming (pp. 281–91), the shaman's journey of descending and ascending (pp. 276–81), and play and adaptation (pp. 284–91). In the experience of descent, the world seems to be coming apart. As a result, the ego is detached from the experience in which it developed, and the individual feels fragmented (pp. 270–73). Reintegration, or "ascent," leads to a new world of direct experience (p. 276). Experience becomes less personal and

more universal and broadly connected (p. 275). In dreaming, we are freed from the demands of the sensory world. We optimize integration and adaptation. This is "free time," recess from egocentric consciousness which is "the school of hard knocks" (pp. 287–88). Awareness is now polyphasic, coming from all neural networks and all phases of consciousness (p. 290).

Finally, the ego can operate in "higher phases of consciousness," or mature contemplation, generating "psychic energy" (pp. 296–333). Mature contemplation relates higher cortical processing with lower metabolic, autonomic, and endocrine activity (p. 296). Thus, psychic energy is operationalized. Deliberately evoking this experience makes possible cross-cultural comparison of mystical experience.

In the concluding chapter, "Neural Organization as Epistemic Process," the authors summarize and extend their uniting of science with contemplation. Science is an outer oriented knowing; contemplation, an inner oriented knowing. These orientations are key. The epistemic process includes the phylogenetic development of the brain, the ontogenetic development of the individual, and the sociogenetic influence of societies (p. 337).

They call the result "anthropology-plus." The plus includes three aspects (p. 347). First, it embeds consciousness in cultural origins and influences, thereby making inquiry "more global relative to culture and more evolutionary relative to our species." Second, its transpersonal phenomenology directs us to "the existence of universal structures mediating experience." Third, the neurosciences make for "a more sophisticated, empirically grounded, ontogenetically and phylogenetically relevant theory of the structures of experience." Pursuit of "the meaning of the Vision Quest" by those capable of mature contemplation can now be informed by "the epistemic foundations of the discipline" (p. 348).

The Sensory-Symbolic Connection. More needs to be said about the book's intertwining of the sensory and symbolic. Either external or internal stimuli can activate the neurognostic process. Regardless of the source, the result is the same, namely, models of the world. These models may come from the "operational environment" below consciousness or the "cognized environment" of consciousness. This distinction between molecular and molar refers to "two levels of organization" and not "two conceptual realities . . . with little in common" (pp. 82–83).

The phantom limb phenomenon provides an example. Even though the sensory receptors are missing, "the somaesthetic model"

of the limb continues in the brain intact. The model of a leg "may be evoked from nerve endings in the stump of the limb, or from within the cognized body itself." The individual continues to " 'feel' the limb for weeks and even years after amputation" (p. 168). From such phenomena, the authors insist that consciousness itself generates content. Content, therefore, is symbolic, not a product of " 'seizing' content from outside itself" (p. 170).

What we perceive can begin "either at the sense receptors or in the imaginal cortex" (p. 170). "The object of perception is constructed *wholly* within the nervous system" itself (p. 171, italics added). In short, "[o]ur cognized environment is a distinctly human one," conditioned simultaneously by cognition and perception (p. 172).

The book is dedicated "to the memory of Victor Turner," indicating the impact of the authors' early ideas on cultural anthropology. In his last major address—at The Oriental Institute in Chicago in 1982—Turner publicly repudiated his own and others' position that *all* human behavior results from social conditioning.

In "Body, Brain, and Culture" (1983), he described his personal difficulty. He acknowledged "there are inherent resistances to conditioning" (Turner 1983, p. 221). He then explored what he called "a new synthesis" between anthropology and neurology. He would have been delighted and informed by the exposition of play in *Brain, Symbol & Experience* (pp. 178-80; 284-91). Play generates experience and information. It replaces "redundancy with novelty and meaningfulness with inquiry" (p. 180). Parents know about such novelty and inquiry in struggling with a child's intrusive and inquisitive stages. With *Brain, Symbol & Experience,* we are now privy to the shape of the new synthesis.

CRITIQUE

Anthropologist Mary Douglas responded to Turner's presentation. Although stimulated by what he was advocating, she told me he was wrong. Along with others, she emphasizes the social construction of knowledge, not its bodily base:

> . . . systems of symbols, though based on bodily processes, get their meaning from social experience. They are coded by a community with a shared history. Because of their hidden origins and community background, many such symbols seem to be more natural than language, but they are culturally learned and culturally transmitted. So the preliminary starting-point for this argument is that there are no natural symbols; they are all social. (1982, xix-xx)

While not agreeing completely with Douglas (see, for instance, Super 1991), I share reservations about the new synthesis.

No Pristine Perception. The notion of the convergence of genes, the individual, and society leads me to question an uncritical acceptance of a transcendental phenomenological approach (pp. 25–33). I find it hard to bracket out the contamination of culture and the weight of individual differences. I question whether they can reject a Neoplatonic perspective (pp. 6–8) yet opt with Edmund Husserl for "the ultimate, essential givenness of phenomena [standing] in pristine purity before the mind" (p. 30). Both individual differences (see, for instance, Plomin and Ho 1991) and cultural commonalities affect perception. Individual variations are as important as central tendencies.

What the authors actually mean by "pristine purity before the mind" may be clarified by Diane Jonte-Pace's study "The Swami and the Rorschach: Projective Tests and Spiritual Disciplines" (1987). She analyzed the protocols of three advanced spiritual masters—a Hindu Vedantist, an Apache shaman, and an enlightened Buddhist master. From a psychological view, their responses to the ambiguous cue cards suggested pathology. They were "at the mercy of the environment," had lost a sense of boundaries, showed signs of depression and anxiety, and exhibited "infantile" and "uncontrollable impulses." However, from a spiritual view, their protocols reflected mystical elements. These included the constant flux of reality, the blurring of self-environment boundaries, and the experience of no-thingness. They each resymbolized their perception, using their own culture to interpret the cosmos. In short, in spiritual experience, ordinary perception is deautomatized and then revoiced. I think this mode of perception may be like the authors' "pristine purity."

Recent work in cognition demonstrates there is no such "thing" as "a thing." Rather, categories come by generalizing from prototypes. Prototypes are imaginative constructions based on several exemplars. The work of Eleanor Rosch, Barbara B. Lloyd (1978), and others on cognition and categorization could support the authors' conviction about contemplation and bracketing.

Awareness of the prototypical nature of cognition minimizes distorting cultural influences and avoids the assumption of perceptual purity. Yet the authors insist the contemplative can apprehend "the sensory aspect of . . . consciousness" directly and "distinct from the mapping of cognition upon it" (p. 25). I disagree and cite evidence of the active shaping of *all* sensory/perceptual processing

(Gregory 1987, pp. 598–601, pp. 608–11). Central and peripheral activity intertwine (see for instance, Trevarthen 1990).

Despite such reservations, the view of experience presented here is basic. Our brain is not "a floppy disk" (p. 66). Our mind is not simply a conscious controller. Information gathering *is* active. We *do* select, operate on, and transform input "from the peripheral receptors to cortical processors" (p. 171). From its origin, human neurophenomenology is perceptual rather than sensory (p. 171). While the idea of pristine perception is questionable, the idea of polyphasic awareness is fruitful.

Polyphasic Awareness. The authors link contemplation to what they call polyphasic awareness. This view contrasts with the monophasic awareness so characteristic of Western consciousness and the waking ego. Whether one is waking, sleeping, dreaming, or in an altered state of consciousness, all experience—regardless of phase—is meaningful as it occurs. Cross-phasing is fluid.

Each phase of consciousness may interpret other phases according to its own context, intention, and logic. The authors characterize the mature state of awareness as a teacher who is "fully informed about all phases of consciousness in each phase of consciousnes." The teacher, that is, "the cortical intentional structures," supervises and participates "in the activities of both the classroom and the schoolyard." The schoolyard full of children is like "[t]he free play among neural networks," important for growth and reorganization. Structured and free-play activity are combined "for greater cohesion and purpose" (pp. 290–91).

Broad Scholarship. References to other positions enlarge the interdisciplinary dialogue. For instance, they describe "our inner-operational environment [as] our *being* and our inner-cognized reality [as] our *empirical ego*" (p. 89, italics in original). They connect these concepts, respectively, with William James's the Self and the empirical Me and with Husserl's Transcendent Ego and the empirical/psychological ego. They draw heavily on Piaget's ideas about cognitive development. Assimilation, or inner integration, and accommodation, or outer adaptation, are key to growth (pp. 249–51).

With linguist Eric Lenneberg, they hypothesize "the deepest structures of lexical intentionality are not to be found in discrete linguistic structures, but throughout the neurocognitive system" (p. 185). In so doing, they fail to recognize that recent clinical evidence contradicts part of his theory. The hemispheres do not specialize over

time. Instead, the data suggest that left hemisphere specialization for language is present at birth. The right hemisphere only acquires language if there has been damage in the left before the age of five (Springer and Deutsch 1989, pp. 288–30; Kolb and Whishaw 1985, pp. 618–19).

Theological Implications. Theological implications are intriguing. For instance, where is "the locus of intentionality," or what I take to be the locus of the holy (see p. 159)? The authors claim the locus lies in peripheral processing as well as central processing. Intentionality is distributed, with no localized ego (see p. 104). Along with hierarchical intention in what we do, which actually *is* an organizing neurognostic process, activity "is actually going on throughout the nervous system" (p. 102).

This neurocognitive view illumines scholarship in comparative religion. Theologian David Tracy draws on philosopher Paul Ricoeur to describe two trajectories, or family resemblances, in patterns of religious belief (Tracy 1981). One is the diffused phenomenology of manifestation; the other, the focused hermeneutics of proclamation. In manifestation, the locus of the holy can be anywhere and everywhere as discerned in mystical presence and natural symbolism; in proclamation, the locus of the holy is specified and identified by virtue of historical claims and behavioral imperatives. These belief patterns suggest neurognostic parallels. Right and left hemisphere processing alternate between diffused impression and focused interpretation, respectively. In manifestation we find a process of immersion in what is immediate, while in proclamation there is a process of declaring what is right.

I have related these neurognostic processes and belief patterns—a broad attentional orientation and a narrow intentional orientation (Ashbrook 1984b)—to church architecture (Ashbrook 1984a; 1984c). There is the domelike archetype of Byzantine Orthodoxy's Hagia Sophia. This basilica reflects numinous presence and the relational processing of the right hemisphere, a reaching out to embrace the world as it is, an isomorphic relationship between the Christian universe and the Roman Empire. In contrast, there is the spirelike archetype of medieval Christianity's Chartres Cathedral. This edifice reflects historical claims and the analytical processing of the left hemisphere, a directing the world to Christ's sacrifice on the altar and how God means life to be.

Tracy adds a third pattern, namely, praxis or theologies of politics and liberation. Architecturally, I associate that pattern with a centering or gathering in community for the sake of caring for the world

(Ashbrook 1988). Mystery and mastery are combined to take account of *human purposes*. This pattern suggests a neurognostic parallel of limbic integration, strategies to nurture one another in ways that are environmentally adaptive. The effort to turn the shopping mall into the Ceremonial Center of Urban America (Zepp 1986) provides an unsuccessful example of such architecture. In the malling of America, we gather to consume rather than to empower.

I suggest a correlation between neurocognitive activity and patterns of belief. The locus of reality is everywhere, as in right brain responsiveness, and in special places, as in left brain vigilance. God is present throughout the universe, as in peripheral activity. God is known also, as in central nervous system activity, in such people as a Moses (whether an actual individual or a composite historicized figure), a Jesus, a Buddha, and every charismatic discloser of a reality that is inclusive and responsive. (See p. 43, for instance, where the authors describe brain organization as "linked to a specific function of the particular locus.") Further, because of the interfacing of genetic and cultural inheritances at the limbic level, we are wired to enhance each other and to accommodate to the evolutionary ecological system of which we are a part (Burhoe 1981). Such theological extrapolations call for further work.

LIMITATIONS

Because of the significance of this work for interdisciplinary dialogue, I identify limitations, specifically: gender, neglect of the religious traditions of the West, linguistic issues, and picky concerns.

Gender. Gender issues are present, though subtle. On a positive note, the authors mostly use inclusive language. That makes reading easier for those aware of patriarchal oppression. However, this reader became aware of an unintended masculine epistemology.

Consider the insistence that "universal structures" underlie cultural elaborations. The authors acknowledge we know more about the galaxies than such issues as the "sexual differentiation of the brain" (p. 34). This is not a warrant, however, to neglect the impact of sex differences on epistemology and phenomenology.

Sex differences appear as early as the sixth week of pregnancy. These result in different maturation patterns (Springer and Deutsch 1989, ch. 7). Although the evidence is mixed (Graber and Peterson 1991, pp. 267–69), language and the left hemisphere tend to develop earlier in girls and visuo-spatial perception and the right hemisphere earlier in boys (Waber 1976). I take these differences to be the basis

feminist scholars use for distinguishing between "experience," "women's experience," and the "genderedness" of all experience (see, for instance, Bynum, Harrell, and Richman 1986).

In "Investigation of Brain Wave Symmetry: An EEG Imaging Study Based on the Wakeful Dreaming Process," Charlotte Smith (1989) found, without exception, different topographic maps of brain electrical activity in a sample of sixteen females and sixteen males. For males, the highest amplitude appeared in the frontal cortex, which suggested conceptualized activity; for females, the highest amplitude came in the central cortex, which suggested visceral processing. In addition, the data showed a lack of differential EEG desynchrony during the imaging task for females. This supported other evidence suggesting more bilateral use of the hemispheres in females than males.

In combining these findings with differences in maturation, I infer dffferences in cognitive orientation. Males are oriented more to a cognized, dichotomized, and impersonal environment. Females are oriented more to an operational, connected, and interpersonal environment. Unless such differences are considered, the authors' explanatory scheme lacks universal relevance.

A holistic agenda, such as the authors espouse (for instance p. 24), cannot minimize sex differences in the brain and gender differences in the mind. Bodies, including neurocognitive processes, are always located in the cultural construction of power relations. The authors fail to address the patriarchal and sexist power patterns in male-female relations, especially in negative associations to feminine (for instance p. 206). However, their use of gender as "a symbolic attribute" of an integrated union of masculine and feminine (pp. 208–11) is suggestive.

Further, consider the metaphors which convey their ideas, illumine issues, and resolve controversy. Their agenda is to establish the significance of mature contemplation. Yet they argue by rhetoric rather than evidence. They liken a rejection of mature contemplation to "entering a boxing match with one hand tied behind the back" (p. 34). In another masculine metaphor, they regard "the target of ritual" as the sensorium of the participants and audience (p. 213). Such imagery suggests an aggressive, not a dialogical approach to knowing.

In emphasizing the goal-seeking "intrinsic tendency [of neurons] to act upon their environment," their primary image is "mutual interpenetration" (p. 36). Possibly this could be an unintended reference to homosexual activity. Such an analogy contributes to

human relatedness and human knowing. But penetration is still an implicit male metaphor.

In relation to gender, I find their position of holistic goal-seeking with specialized activities fruitful. Many neurognostic processes suggest how the ego is side-stepped (p. 204). "[F]ew if any neurons are loners. They almost always develop as part of a society of neurons and support cells" (p. 36). Local circuits are integrated via "a series of feedback loops" (pp. 35–36). The complexity of interconnections is "dazzling" (p. 37). The glial cells contribute to the development of, say, the corpus callosum (p. 39). The "association model" of intrinsic motivation is more basic than a "reinforcement model" of external stimuli (pp. 39–40). The authors note that Sir Charles Sherrington pictured the brain's operations as an "enchanted loom" (pp. 102–3). Even though the authors did not use their own combined metaphors of "fertility and penetration" (pp. 217–19), their model allows for just such metaphoric inclusive elegance.

Another subtle male-related metaphor is the (unacknowledged Korzybski [1933]) reference to the idea that "the map is not the territory" (p. 84). Because of early maturation of visuo-spatial skill, males are more comfortable with the physical environment. In contrast, because of early maturation of verbal-linguistic skill, females are more comfortable with the social environment. Maps speak more of a visuo-spatial mind, while a metaphor like "the menu is not the meal" speaks more of a communal mind. Historian Caroline Walker Bynum (1987) has shown how feminine spirituality in the high Middle Ages involved "holy feast and holy fast." Daily food and eucharist were intertwined.

Consider the authors' insistence upon neural networks and associative processes. The image of the map reinforces the model-generating metaphor of the nervous system. Suppose we alternate or overlay the concept of a map-model with the concept of a web-network? What if the authors had used their passing reference to Ernst Cassirer's idea of "symbolic pregnance . . . as an urge to flesh out the meaning of things to their fullest extent" (p. 179)? The result would heighten the effectiveness of the map-model of neocortical processes and the web-networking of subsymbolic processes. Such a use of multiple metaphors carries us beyond cognized, gendered encapsulation. We then move in the transcendent richness of the open system of which we are a part.

Metaphor is basic to cognition. But I question the authors' assumption about "universal" experience (for instance pp. 208–11). Male scholars and scientists, and these authors who like myself are

male, have obscured the critique and contribution of female scholars and scientists. (See, for instance, Harding and Hintikka 1983, or Kimura 1985). The explanation of the qualifying impact of sex and gender is limited to symbolic attributes rather than inclusive of neural differences (pp. 205–11).

Neglect of Western Religion. Western science and ordinary consciousness are called to account. One result is the neglect of Western religion. By "the meaning of the Christian cross," the authors refer only to its capacity for multiple referents. These include something "suspended around a woman's neck, above a papal altar, or before the eyes of a vampire" (p. 166), or an object used in ritual (p. 196). Such referents are hardly substantive religious ramifications of neurognostic processes. (The sole exception is Roland Murphy, "A Ceremonial Ritual: The Mass," in d'Aquili, Laughlin, and McManus [1979], and not cited in this 1990 work.)

They describe a Buddhist Tantric Tibetan mind-set as a mature stage of consciousness (pp. 198–211). This is Eastern. I would hope they would continue their interpretive work by reengaging a Western theological mind-set, discerning in it a mature stage of consciousness as well. They did lift up Martin Buber's nondualistic I-thou relationship (p. 91); and while Paul Tillich was referenced, his ideas were not addressed. The Hebrew word for *heart—leb, lebab*—is similar to Buddhist intuitive knowledge. *Heart* was thought to be the seat of psychic life, including emotions, intellect, volition, morality, as well as contact with God. Such qualities reflect mature consciousness.

They could complement their interpretation of Buddhist meditations by interpretation of Christian meditations. I immediately think of many: the Benedictine discipline of listening to the world, *The Cloud of Unknowing,* the concentrative meditation of Saint John of the Cross, Meister Eckhart's "letting go into God," Julian of Norwich's "showings," Nicholas of Cusa's "Learned Ignorance," and Brother Lawrence's "Practice of the Presence of God," to mention just a few. Their reporting of the Sacred Heart tradition within Roman Catholicism (pp. 306–7) only makes one wish for more.

Linguistic Issues. The authors distinguish "between direct sensory experience and the possible interpretations" (e.g., p. 292). This gap between input and interpretation is supported by recent evidence in how the brain organizes thought and language (Blakeslee 1991). Different brain areas process different bits of information. These special areas cluster input according to stimulus attributes. The components are then projected to common "convergence zones." It is here that

the distributed pieces of knowledge are brought together in reactivating concepts. A third convergence zone is postulated. This zone mediates, in some yet to be understood way, between word and the convergence zone of the concept. That mediation is the basis of linguistic operations, of which interpretation is central. Evidence of convergence zone activity supports the identified gap between stimuli and interpretation.

Yet Laughlin, McManus, and d'Aquili's discussion of the neurognostic processes which subserve knowing could have been enhanced by inclusion of other linguistic analyses. I think of George Lakoff's *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind* (1987) and philosopher Mark Johnson's *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason* (1987). Both authors emphasize the metaphoric basis of language (see also, Lakoff and Johnson 1980). In doing so, Lakoff and Johnson draw on the work of Eleanor Rosch as to what constitutes a category or a "thing." They propose that all knowledge is a matter of experiential realism. What we take as an object is actually an imaginative generalization based on several exemplars. This is prototypical cognition, a process analogous to convergence zone evidence.

Mary Gerhardt and Allan Russell, in philosophy and science (*Metaphoric Process: The Creation of Scientific and Religious Understanding,* 1984), and Sallie McFague, in theology (*Metaphorical Theology: Models of God in Religious Language,* 1987), also explore the richness of metaphor and interpretation. Laughlin, McManus, and d'Aquili join them in rejecting a world of stable objects or nouns (pp. 6–8). Yet they could have analyzed these surface manifestations of neurognostic activity by more attention to metaphor and prototype.

The authors establish that myth, poetry, and other symbolic performances possess the same formal sign system capacity as mathematics, geometry, and symbolic logic (p. 186). It would have been logical, neurognostically speaking, to show that mathematics, geometry, and symbolic logic possess a similar capacity for "alternative orders of reality" as myth, poetry, and other symbolic performances. I advance this because the authors describe science as expressing all four levels of the symbolic process (ch. 6)—that is, primitive symbol as anything which provides access to a model that contains more information than the stimulus itself (p. 165); symbol as a model mediating meaning (pp. 172–73); sign as a specialized symbol in a greater symbolic system (pp. 182–83); and formal sign found in abstract thought (pp. 185–87).

For the authors, science is "[t]he most obvious use of formal sign systems in the process of symbolic integration of the cognized.

environment" (p. 186). Such a hermeneutic could be used with regard to formal sign systems in theology as well. In rejecting "the arbitrary distinction between 'primitive' and 'civilized' modes of thought" (ibid.), they could extend their analysis to traditional carriers of Western religious consciousness. Theology, like science, expresses all four levels of the symbolic process—the operational and experiential environment of symbol and primitive symbol and the cognized environment of sign and formal sign.

Thus, I assume that the whole brain reflects the farther reaches of our presence in the universe. When cultures forget their context, trouble follows, whether a culture shows an interpretive or an intuitive bias. Only by understanding ourselves in a cosmic context is our interpretive capacity at the service of our intuition and our intuition enhanced by our symbolic capacity.

Picky Concerns. I note three picky concerns: a view of contemplation that is too narrow; a difficult style; and missing references.

In regard to mature contemplation, the authors minimize Herbert Benson's "relaxation response" as only tapping "a singular, generalized" response (p. 309). His seasoned research (for instance, *Beyond the Relaxation Response* 1984) provides a structural understanding of cross-cultural meditation. The issue is not "excitation versus relaxation" (pp. 309–10), but both, as they indicate. Roland Fischer's "Cartography of Ecstatic and Meditative States" (1971) shows that either arousal or relaxation can fire an altered state of consciousness. Such an understanding supplements their discussion of autonomic retuning and the restructuring of the ergotropic-trophotropic balance of excitement and calm (pp. 313–23).

What was apparent in the 1974 volume chokes this work. The writing is dense. I refer to a sentence such as "an oppositional distinction between ego and world—a world, incidentally, that includes our bodies . . . carries the adaptive interoceptive-exteroceptive distinction into the realm of erroneous distortion" (89). They often acknowledge and then skip other positions. For instance, a sentence like the following illustrates the pattern: "We have no desire to become enmeshed in this web of controversy . . . But we will touch on several issues relevant to these controversies as they appear to be integral to our general thesis" (p. 167). Better if they had sailed straight into the wind of controversy guided by the steady rudder of their own clarity (cf. p. 81).

The writing is spiced with newly coined words and phrases. These include *processual, transcendental reduction, universal epoche, creode, equilibration, principle of adaptive diagnosis, biogram, neoneurognosis and*

paleoneurognosis, cognized and operational environments, semiotropism, and homeomorphogenesis, to mention a few. The book is not "reader friendly." The authors assume knowledge of anthropology, the neurosciences, and comparative religion. At one point they replaced a technical phrase—"the 'hermeneutical circle' "—with a less technical one—"the *cycle of meaning*" (p. 214, italics in original). This demonstrates that fewer technical terms were possible.

Their concern is with "the structural underpinnings of experience" (p. 108). So they use a neuroscientific language. On every page are passages like "Metaphor is mediated by largely cortico-cortical homeomorphogenic entrainments, whose associative processes remain unconscious to the mind using metaphor" (pp. 194–95). Or again, "Lateral (or 'granular') preferred cortex has exhibited allometrically greater development than most other areas of the nervous system in hominid evolution . . . and is richly and topographically interconnected with the mediodorsal nucleus of the thalamus, the parvocellular portions of which are phylogenetically the most recent thalamic area to develop" (pp. 112–13). Having arrived at a comprehensive and coherent explanation, I would hope they would translate that into accessible language.

The figures and diagrams do not always enhance the text. For example, figure 14 (p. 74) shows the evolution of neurognosis from the simple reflex to complex responses of adaptation as arrows moving outward and upward. The picture fails to convey the transformative pattern of evolutionary processes. Higher and more complex patterns reach down and qualify lower and less complex patterns.

The index left this reader frustrated. An association to an author's position was often thwarted because the name, if referenced at all, had but one or two page citations. That limited the comparisons raised by the text.

CONCLUSION

Despite its limitations, this book is a landmark. It makes human consciousness sensible and thereby something to be cherished. It challenges us to relate philosophy, sociology, and theology to what is cultural for the sake of a more human and more humane humanity. It connects all that we know to a neurophenomenological base.

Paradoxically, that agenda, in my mind, shifts attention from contemplative consciousness back to ordinary consciousness and on to prophetic consciousness. With "the least of these" (Matthew 25 : 45), the marginalized and oppressed, we are to be liberated from cultural

encapsulation. We are to feed the hungry, give drink to the thirsty, welcome the stranger, clothe the naked, care for the sick, visit the imprisoned (Matthew 25 : 31–46). We are called to bring good news to the poor, free the captives, give sight to the blind, set at liberty the oppressed, and proclaim God's righteousness (Luke 4 : 16–21). This multidisciplinary effort enlarges the discourse from enclaves of specialized scholarship to the whole human community. Neurognostic processes direct us to cosmic imperatives of how we are to live together as one human family on one planet earth. Here we find what makes for optimal adaptation, individually and collectively.

In the conversation about religion in an age of science, the authors have furthered the input from anthropology. Besides the work of physicist David Bohm, I hope they will engage the work of Ralph Wendell Burhoe, Ian Barbour, Holmes Rolston, III, Philip Hefner, Karl Peters, John Polkinghorne, Arthur Peacocke, and others associated with IRAS and *Zygon*. D'Aquili has made major contributions, but this book reflects those conversations only indirectly.

Brain, Symbol & Experience stands between the physical sciences on one side and the hermeneutic disciplines on the other. It makes human consciousness sensible in its phylogenetic origin and its ontogenetic development. The authors' boldness comes in affirming "the human brain as the main locus of causality" (p. 161). While this is hard reading, it stretches mind and heart. It might even become a classic.

REFERENCES

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

———. 1984b. "Juxtaposing the Brain and Belief." *Journal of Psychology and Theology* 12 (3): 198–207.

———. 1984c. *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 the Light of Brain Research.* Bristol, Ind.: Wyndham Hall Press.

Benson, Herbert. 1984. *Beyond the Relaxation Response.* With William Proctor. New York: Times Books.

Blakeslee, Sandra. 1991. "Brain Yields Clues on Its Organization for Language." Science Times, *New York Times.* September 10, C1, C10.

Burhoe, Ralph Wendell. 1981. *Toward a Scientific Theology.* Belfast: Christian Journals.

Bynum, Caroline Walker. 1987. *Holy Fast and Holy Feast: The Religious Significant of Food to Medieval Women.* Berkeley: Univ. of California Press.

Bynum, Caroline Walker, Steven Harrell, and Paula Richman, eds. 1986. *Gender and Religion: On the Complexity of Symbols.* Boston: Beacon Press.

d'Aquili, Eugene G., Charles D. Laughlin, Jr., and John McManus. 1979. *The Spectrum of Ritual.* New York: Columbia Univ. Press.

Douglas, Mary. 1982. *Natural Symbols: Explorations in Cosmology.* New York: Pantheon.

Fisher, Roland. 1971. "Cartography of Ecstatic and Meditative States." *Science* 174: 897-904.

Gerhardt, Mary, and Allan Russell. 1984. *Metaphoric Process: The Creation of Scientific and Religious Understanding.* Fort Worth: Texas Christian University.

Graber, Julia A., and Anne C. Petersen. 1991. "Cognitive Changes at Adolescence: Biological Perspectives." In *Brain Maturation and Cognitive Development: Comparative and Cross-Cultural Perspectives,* ed. Kathleen R. Gibson and Anne C. Petersen. New York: Aldine De Gruyter.

Gregory, Richard L., ed. 1987. *The Oxford Companion to THE MIND.* With the assistance of O. L. Zangwill. New York: Oxford Univ. Press.

Harding, Sandra, and Merrill Hintikka, eds. 1983. *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology, and Philosophy of Science.* London: D. Reidel Publishing Company.

Johnson, Mark. 1987. *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason.* Chicago: Univ. of Chicago Press.

Jonte-Pace, Diane. 1987 *"The Swami and the Rorschach: Projective Tests and Spiritual Disciplines."* Presented to the Person, Culture, and Religion Section of the American Academy of Religion annual meeting. Boston, December 1987.

Kimura, Doreen. 1985. "Male Brain, Female Brain: The Hidden Difference." *Psychology Today* 19 (November): 50-58.

Kolb, Bryan, and Ian Q. Whishaw. [1980] 1985. *Fundamentals of Human Neuropsychology.* 2d ed. New York: W. H. Freeman.

Korzybski, A. 1933. *Science and Sanity.* 4th ed. Lakeville, Conn.: The International Non-Aristotelian Library Publishing Company.

Lakoff, George. 1987. *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind.* Chicago: Univ. of Chicago Press.

Lakoff, George, and Mark Johnson. 1980. *Metaphors We Live By.* Chicago: Univ. of Chicago Press.

Laughlin, Jr., Charles D., John McManus, and Eugene G. d'Aquili. [1990] 1992. *Brain, Symbol & Experience: Toward a Neurophenomenology of Human Consciousness.* Boston: Shambhala. Reprint. New York: Columbia Univ. Press.

———. 1974. *Biogenetic Structuralism.* New York: Columbia Univ. Press.

McFague, Sallie. 1987. *Metaphorical Theology: Models of God in Religious Language.* Philadelphia: Fortress Press.

Plomin, Robert, and Hsiu-zu Ho. 1991. "Brain, Behavior, and Developmental Genetics." In *Brain Maturation and Cognitive Development: Comparative and Cross-Cultural Perspectives,* ed. Kathleen R. Gibson and Anne C. Petersen. New York: Aldine De Gruyter.

Rosch, Eleanor, and Barbara B. Lloyd, eds. 1978. *Cognition and Categorization.* Hillsdale, N.J.: Lawrence Erlbaum Associates.

Smith, Charlotte. 1989. "Investigation of Brain Wave Symmetry: An EEG Imaging Study Based on the Wakeful Dreaming Process." Ph.D. diss. Northwestern University, Evanston, Ill.

Springer, Sally P., and Georg Deutsch. [1981] 1989. *Left Brain, Right Brain.* 3d ed. New York: W. H. Freeman.

Super, Charles M. 1991. "Developmental Transitions of Cognitive Functioning in Rural Kenya and Metropolitan America." In *Brain Maturation and Cognitive Development: Comparative and Cross-Cultural Perspectives,* ed. Kathleen R. Gibson and Anne C. Petersen. New York: Aldine De Gruyter.

Tracy, David. 1981. *The Analogical Imagination: Christian Theology and The Culture of Pluralism.* Chicago: Univ. of Chicago Press.

Trevarthen, Colwyn, ed. 1990. *Brain Circuits and Functions of the Mind: Essays in Honor of Roger W. Sperry.* New York: Cambridge Univ. Press.

Turner, Victor. 1983. "Body, Brain, and Culture." *Zygon: Journal of Religion and Science* 18 (September): 221-45.

Waber, D.P. 1976. "Sex Differences in Cognition: A Function of Maturation." *Science* 192: 572-73.

Zepp, Ira G. 1986. *The New Religious Image of Urban American: The Shopping Mall as Ceremonial Center*. With introduction by David Carrasco. Westminster, Md. Christian Classics.