Reviews

Brain Research and Personhood: A Philosophical Theological Inquiry. By EUGENE P. WRATCHFORD. Washington, D.C.: University Press of America, 1979. 165 pages. $8.60 paper.

Contemporary research in the brain sciences promises to provide the essential methodological and substantive link between the sciences and the humanities, the material and the spiritual, body and mind, nature and culture, facts and values, theories of consciousness and theories of historical development. The human nervous system is a material entity subject to the operation of the laws of physics. This same nervous system is also the fundamental mechanism through which physicists come to a knowledge of the laws of physics, human cultures are created, and human beings engage in social, mental, and spiritual activities involving the application of value judgments. An adequate understanding of the laws of brain operation would be a powerful guide in resolving the many value problems that we face at the end of the twentieth century and beyond.

Eugene P. Wratchford's book, which is a publication of his doctoral dissertation done at the Hartford Seminary Foundation, represents an attempt to point us toward the task of constructing a causal model of the operation of the nervous system and to indicate the possible philosophical and theological significance of such an accomplishment. Since the book deals with aspects of the thought of a number of people who have written articles in *Zygon*, makes extensive references to various *Zygon* papers, and treats directly issues with which *Zygon* is concerned, it is bound to be of interest to this journal's readers. It is a nontechnical philosophical essay.

The first part of the book is devoted to an interesting and detailed presentation of some current experimental findings and related ideas as to how the brain functions. Wratchford examines primarily the work of a number of neuropsychologists on the effects of various brain lesions on perceptual and cognitive functions. The neuropsychological research he discusses includes A. R. Luria's "syndrome analysis" and functional systems approach, Norman Geschwind's "disconnexion syndromes" (studies of alexia, agraphia, aphasia, apraxia, etc.), R. W. Sperry's "split-brain" studies on hemispheric specialization, José M. R. Delgado's studies of the specifically different effects on mental functions of electrical stimulation of different areas of the brain, and Karl H. Pribram's "systems" neuropsychology and ideas on learning and memory. He also relies a great deal on the biogenetic structuralism of Eugene G. d'Aquili and Charles D. Laughlin, Jr., especially their idea that the human person is genetically programmed with a "cognitive imperative." This is the person's "urge *consciously* to order reality in a meaningful manner" or "to extend his conscious ordering, with the aid of symbolic language, beyond the immediate sensory field, which in turn makes possible rational and mythological model building about himself and his external world" (pp. 64-65).

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The core of the material on the brain is an extensive outline of Luria's division of brain operation into three functional units: one for regulating tone or level of activation of any part of the brain (located in the reticular system or brain stem and parts of the limbic system); a second for receiving, analyzing, and storing information arriving through the various sensory modalities (located in the primary sense projection areas, secondary association areas, and tertiary integration areas); and a third for programming, regulating, and verifying the consequences of behavior (located in the motor cortex, precentral gyrus, and frontal lobes). Special importance is attached to the unique development in humans of the inferior parietal lobule in the dominant hemisphere (for its role in abstract cross-modal sensory integration and concept formation), the expanded frontal cortex ("in the formation of intentions and programmes, and in the regulation and verification of the most complex forms of human behavior"), and the Broca and Wernicke areas (in verbal behavior and verbal comprehension). Reports on the effects of lesions in the minor hemisphere, in addition to split-brain studies, indicate that this hemisphere is involved in spatial orientation, sense-of-body schema, personality, emotion, and so-called intuitive and holistic perception, in contrast to the logical, analytic, and verbal functions encoded in the dominant hemisphere. The idea that the limbic system–frontal cortex–inferior parietal lobule connections of the dominant hemisphere and the minor hemispheric structures both somehow might be related to human emotions and values is briefly mentioned in part 1 (pp. 38-40, 52-53, 93).

The more prevalent American approaches of neurophysiology, biochemistry of the brain, and experimental psychology are for the most part not included in Wratchford's study, although brief reference is made to some elementary neuroanatomical and neurophysiological data (pp. 9-14, 55-56). Consequently, since he adopts Luria's bias against neo-Pavlovian stimulus-response approaches and does not mention B. F. Skinner or any other American behavioristic, conditioned-reflex approaches, it is somewhat understandable that he thinks stimulus-response, conditioned-reflex models cannot explain goal-oriented behavior (see pp. 34, 37, 67, and 98). We are given some idea of the role of different areas of the brain in various mental functions, if we can trust the adequacy of current brain-lesion studies and Luria's type of modified localization of function models. However, some researchers such as Richard L. Gregory, who take an engineering approach and feel that the question of overall design (i.e., what the brain is designed to do, what its purpose is) must be carefully understood before a full understanding can be reached as to the functioning of its parts, are quite critical of localization of function models. (If one's head is near the exhaust pipe of an idling automobile one might think that a car is a monstrous and highly inefficient hair dryer and try to figure out the functions of its parts on that basis with very misleading results.)

Wratchford continually asserts that all of the different areas of the brain must work together in the performance of any mental function. But we are given no overall theory of brain operation, firmly grounded in neurophysiology and biochemistry, to explain how it all works together. Switching from simplistic to more complex localization of function models, as Luria has done, is a significant advance, but it does not solve the problem or give us full understanding of what the brain is designed to do and how it works. All we then know is that several or more areas, instead of only one, are involved in a particular activity. No specific mental function is carefully analyzed or modeled, the intrinsic and essential relation of all thought to the ordering of

behavior is not clearly drawn, and a very inadequate attempt is made to correlate the development of the higher or more complex mental functions with biological drive factors (see pp. 104-7). Such omissions become a serious problem in the second half of the book where emotions and values seem to have at least a semiindependent status from perceptions and cognitions and neither are related to the fundamental problem of how to order one's behavior in the human historical and social world. Nevertheless, within the narrow confines of his choice of brain-research material, Wratchford makes a good case for his very limited claim that the human mind is constructed out of divisible parts "and that its construction, or lack of it, and its destruction or dissection, involve the various concertedly working functional units of the brain and the various forms of cell growth" (p. 59).

I must add that with an interacting conditioned-reflex approach, such as that developed by Peter Putnam, one could begin to show that the mind is a constructed, composite, functional process not simply because of the composite nature of the machinery of the brain but by virtue of its contents. These are constituted by the masses of interacting conditioned reflexes (both verbal and nonverbal behaviors) encoded in the brain, which have been learned from interaction with significant others of the social environment. As George Bernard Shaw has noted, the human person is like a drama shop with many different voices and behaviors competing for emission time. The mind or person is composite in an even more fundamental sense than Wratchford suggests. It is not just a neuropsychological composition, and it is not just that it depends on interaction with the environment for its self-construction. More than this, its elementary units, its neural conditioned-reflex linkages, constitute a fundamentally social composition. However, Wratchford excludes a conditioned-reflex approach and any related consideration of sociocultural determinants of mind on methodological grounds, so he is forced by his method to orient culture as "a part of the human's external environment" and not as constitutive of the mind itself (pp.9, 96, 106). He has some good quotes from Delgado who presents evidence to show that "the basis of mind is cultural, not individual" (p. 67). But this point never really becomes an integral part of Wratchford's argument. After a section on the environment as a causal factor in the construction of the mind (pp. 66-73), he returns to the individualistic neuropsychological approach which dominates most of the book.

Wratchford discusses the neurophysiologist John C. Eccles's view of the relation between brain and mind as an objection to Wratchford's thesis that the mind is a complex, composite function of the genes, the environment, and the various integrated areas of the individual working brain and not an independent, indivisible substance or entity (pp. 74-90). I do not think Eccles's own particular idea as to the relation between mind and brain is at all clearly worked out, not to mention defensible. However, if his objection is read as a denial that the kind of material Wratchford has presented fully accounts for and explains the meaning of such categories as subjectivity, consciousness, mind, and soul, then I would side with Eccles. In fact, at the end of his discussion of Eccles's view, Wratchford himself sides with Eccles by saying, "I believe that we probably will never answer such questions" as "why must the human brain under the proper circumstances become self-conscious?" (p. 90). It also seems to me that Eccles's grounding of epistemology in human subjectivity and his unwavering linkage of the verbal function with human self-consciousness are both more nearly correct and more in line with Alfred

North Whitehead's philosophy (which Wratchford uses to "complete" his thesis) than Wratchford's own view.

I think Eccles's insistence on a dualistic position is a fundamentally correct one in the sense that we do indeed have two separate, all-inclusive sets of categories which are very different from each other. On the one hand, we have the metaverbal-mathematical categories of the material world that science represents (electrons, atoms, genes, nerve firings, etc.); these are clearly not subjectively felt categories. We do not feel electrons, neural firings, holograms, or any other kinds of matter-energy patterns running around in our heads. These categories and any future ones that might describe the brain's operation in even greater detail are all unfelt categories of indirectly implied construction. On the other hand, there is another whole, undeniably real realm of categories that we call felt or subjective categories, the categories of experience. We experience the world and ourselves as concepts, not as matter or machine. René Descartes's dualism is very well grounded and cannot be swept under the rug as easily as Wratchford (and many of the contributors of articles to *Zygon*) would like to think.

Switching from substantival to processual categories, as Whitehead did and as Wratchford, following Whitehead, wants to do, is no solution. It is merely a change of words. Wratchford's position is just as fundamentally dualistic as Eccles's philosophy. In viewing the mind as a function of genes, environment, and brain Wratchford has left out any reference to subjective categories. Sensing the incompleteness of what he has done, he drops the discussion, in the second part of the book, of the material categories and brings back in all the subjective categories that he left out in the first part. As Putnam has commented in an analysis of Whitehead which is also applicable to Wratchford, "there is the meta-verbal systematization of the world, which is the material side, with its 'substance,' and there is the felt systematization, with its substance. The task is to carry through on defining one in terms of the other. Whitehead in effect is trying to deny the very possibility of doing this in denying dualism" ("Re: Alfred North Whitehead (Peacemaker and Gateway)," manuscript, March 31, 1968, p. 129]. In denying dualism Wratchford too makes it impossible for himself to explain self-consciousness, personhood, and valuation in terms of a brain model.

The only other aspects that are added to Wratchford's combination of genes, environment, and brain to constitute personhood are such features as the circadian rhythms of the body and the remainder of the hormonal, metabolic, and other internal bodily functions besides those brain functions specifically involved in mental activity. The concept of mind is said to be an abstraction from the behavior of the brain and the concept of the person is an abstraction from the behavior of the total organism. Since our brains do not function without our bodies, what he essentially does is simply to identify the concept of mind with the concept of personhood. He sums up the section on personhood with this statement: "If *Homo sapiens*, then, is to be considered unique in terms of having personhood in any meaningful sense, the presence of neocortical behavior must be the defining factor" (p. 108). This criterion of the presence of neocortical activity is then offered as a basis for value judgments in the treatment of "human individuals in which neocortical behavior has not developed, or is not possible, or no longer exists" (p. 110). As noted earlier, since society, culture, and history are methodologically excluded from his study of the working brain of the human individual, little more is said about personhood in his altogether too brief and unsatisfactory section on "The Person" (pp. 103-10).

In the last part of the book Wratchford attempts to extend his "human model" (his ideas on brain function, the mind, and personhood) by embedding it within a "world model" (Jacob Bronowski's evolutionary philosophy) and then completing it with a "value-giving or theological model" (Whitehead's philosophical theology). He gives a detailed exposition of Bronowski's article, "New Concepts in the Evolution of Complexity: Stratified Stability and Unbounded Plans" (*Zygon* 5 [March 1970]: 18-35), in order to argue that inorganic and biological evolution can be causally explained without recourse to considerations which lie outside the laws of physics such as predetermined "higher laws or master plans" (p. 117) or an "outside creative and sustaining force" (p. 119). This is an expansion of Wratchford's thesis that the concepts of mind and personhood can be causally explained as a function of genes, environment, and brain operation without recourse to explanations which lie outside the scope of the laws of physics. In other words, he seems to want to follow Bronowski in treating problems in chemistry and biology as problems in applied physics, with problems in neuropsychology treated as problems in applied physics also.

But in the end both his "human model" and his "world model" are declared to be incomplete, which indeed they are. Wratchford thinks these models may satisfy our cognitive, rational understanding, but they do not satisfy our emotional needs, our need for our existence to be given value or to be found valuable, our need for a sense of psychological well-being (pp. 113-15, 129-36, 152-54). Herein lies the most fundamental shortcoming of Wratchford's book. Instead of following through on the promise of brain research and Bronowski's work by arguing that even problems in values possibly might be treated as problems in applied physics (with the help of a more adequate overall brain model) and that current models of brain operation need completion in their own terms if a bridge from facts to values is to be made, he abandons this approach. He seems to believe that not just his but any brain model needs completion from the outside by religious myths as interpreted through the philosophical theology of Whitehead's organismic metaphysical system. His primary interest is in Whitehead's conception of God because he wants to find in it a center of value which lies "beyond the scope of human experience" (p. 113) and yet not outside the scope of the laws of physics but within the cosmos. In fact, he identifies the concept of God with the concept of the universe as an evolving, unified, cosmic organism or ecosystem (p. 136). The center of value or God is the system as a whole and not any one of its parts.

In order to explicate Whitehead's concept of God, Wratchford gives a fairly extensive outline of Whitehead's metaphysics. Whitehead has many useful insights into the structure of experience or subjectivity as it is actually felt and not simply talked about. He makes a significant contribution toward conceptualizing some of the essential characteristics and qualities of experience which will have to be explained in any fully causal overall model of nervous-system operation. The clarity of his concept of consciousness is an excellent instance in which his categories would have helped Wratchford's earlier exposition of his "human model." But Wratchford is not clear on the centrality of the subjective, the category of experience, in Whitehead's metaphysics and seems to confuse it with a comment Whitehead made about everything consisting of fluent energy, which is a totally different category (p. 141). In any case, Wratchford makes no attempt to show how Whitehead's careful analysis of experience as felt can be grounded in the principles of brain operation that he outlines in the first part of the book.

There are many problems with Wratchford's development of Whitehead's concept of God, with his identification of God with "the system," with his failure to deal with the question of God as personal and not only universal, with his conception of the center of value, with the primacy he gives to the universal category of the aesthetic (harmony) and his neglect of the more locally applicable category of obedience as the basic guide in value conflict, with not taking sides when God does take sides (the side of the rejected, those who have no place in the system), with his use of the work of d'Aquili and Laughlin on the biopsychological determinants of religion, with his separation of conceptualization from valuation, etc., which cannot be dealt with in this review. Wratchford is tremendously impressed, and rightly so, with the advances that science has made toward an understanding of the whole of the life sphere, especially with the advances in brain research and evolutionary theory. He strains to bring the whole of life under scientific, empirical, causal categories. This is the central thrust of the first two-thirds of the book. But in the last part, on Whitehead's philosophical theology, he quite fails to push through to the completion of his project because he does not have the conceptual tools available to finish the task. Yet it is a significant attempt, and it certainly helps prepare the way for what needs to be done.

The final tension or conflict in Wratchford is between Bronowski's attempt at a causal, mathematical, mechanistic theory of evolution and Whitehead's intuitive, poetic, speculative, organismic metaphysics of subjectivity. There is absolutely no place for subjectivity, feelings, or prehensions in Bronowski's account of inorganic and biological evolution. And there is absolutely no place for nonsubjective entities in Whitehead's metaphysics. Wratchford does not clearly distinguish the very different character of these two views and at times tries to make it appear as though they are saying essentially the same thing. Wratchford's conflict is not between conceptualization and valuation, which he erroneously projects into separate structures and functions of the brain. Rather it is a conflict between one conceptualization with its valuation and another conceptualization with its valuation. The problem is that neither view is adequate or goes far enough, neither can beat out or clearly subordinate the other, and he has no choice but to try to hold them together unstably until he can build an enlarged causal model that contains them both as special cases or aspects of itself. Each side has what the other side needs to make it complete. Wratchford pretends to a completion that he does not attain and that is not to be found in Whitehead either. His "solution" is to try to hold the contradiction together, not reconcile it.

The key to linking Bronowski and Whitehead lies in linking causal law to subjectivity. The threat on the human historical level has been that if causal law is the basic orienting structure that controls and determines the ordering of all things, including human institutional change, then the evolutionary process, including human cultural evolution, is beyond our immediate awareness and control. Human subjectivity would then seem to be an irrelevant epiphenomenon. This was what Whitehead feared in his analysis of the inroads that science was making into human life. But the situation is saved paradoxically by the fact that causal law is the very form of our own will, the form that our own will takes as it becomes known to us. We do, in fact, seek or will to act in accordance with our own knowledge of causal law. In such a perspective human conflict can be viewed as the investigation of competitive causal insights in the attempt to drive up or force the emergence of a new and more inclusive understanding of causal law that resolves the conflict.

It is most encouraging and significant to see brain research and philosophical theology dealt with seriously and in depth in the same book. In spite of my pervasive critical comments, or rather because the book was so effective in arousing them, I appreciated it and think it is noteworthy. Such criticisms as I have offered can be better evaluated by one's own reading of the book. Even if, in my opinion, the book fails in its aim, it is a challenging, provocative, and worthwhile effort, and I commend it for all who are interested in wrestling with the problems it addresses.

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Charles Darwin and the Problem of Creation. By NEAL C. GILLESPIE. Chicago: University of Chicago Press, 1979. 201 pages. $16.50.

Neal Gillespie, professor of history at Georgia State University, presents us with a well-researched essay on Charles Darwin. It contains 156 pages of text, 14 pages of bibliography, and 26 pages of footnotes. Like many others, Gillespie became curious why Darwin spent so much time attacking the idea of divine creation. He wrote this book in an attempt to answer the question in which way creation was a problem for Darwin.

A large part of the conflict into which Darwin was drawn arose from two major epistemes in natural history, positivism and creationism, that invoked different standards of scientific knowledge and influenced in many ways the practice of naturalists and their theories about nature. Positivism saw the purpose of creation to be the history of laws which reflected the operation of purely natural or "secondary" causes. Many of these positivists were theists or even good Christians. Yet, contrary to creationists, they did not reflect upon God in their scientific pursuits. For them science as a whole for the first time openly developed a completely natural world system, one which was neither logically nor theoretically obligated to theology in any way. So there was a "willingness of so many scientists, even pious ones, to dispense with the God hypothesis as a part of the presuppositions of scientific work" (p. 13). There was a gradual movement in the nineteenth century from the conception of a law of nature as divine will to a law as no more than observed regularity of behavior. This shift is reflected in Darwin's continuing frustration over defining the relationship of the creator to the world. Gillespie wants to show in his essay that this shift of episteme (from creationism to positivism) can be observed in Darwin's own work. He also wants to show that many theists were never entirely easy within the fold of the new positive science.

The main struggle, however, was not between science and religion but between two systems of science, the one in which theology still dictated the ways of looking at science and the other that was understood as being self-sufficient. Gillespie claims that "Darwin's hostile preoccuption with the belief that God has separately and individually created each of the animal and plant species in the world is one of the most intriguing but neglected features of the *Origin of Species*" (p. 19). Darwin's eventual rejection of a special creation can be seen as part of the transformation of biology into a positive science. Since

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creationism had run into increasing difficulties, Darwin wanted to resolve the crisis by promoting the restructuring of biology along positivist lines. When Darwin attacked special creation, he was not assaulting a moribund theology but a living and powerful idea. For instance, Charles Lyell, Louis Aggassiz, Georges Cuvier, and Adam Sedgwick still believed in miraculous creation when the *Origin of Species* appeared in 1859. But for Darwin special creation was a dead end since it asserted causes beyond conceptualization. He wanted intellectual autonomy of science from other influences, such as religion. When he wrote his *Origin*, Darwin did not set out to prove evolution, as some assumed, but he introduced evolution as a hypothesis, "based on plausibly ordered evidence and heuristic in purpose" (p. 63). Of course, Darwin had his own scientific presuppositions. He stated that nature is to be explained by unvarying laws and that there is no proper limit within nature to the inquiries of science.

It was not so simple for Darwin to break with the Bible as the source of scientific truth. For instance, he was preoccupied with design throughout his life, and he was quite often ambivalent to it. It was a nagging doubt that never left his mind and he found it difficult to build a model to test the argument for design within a world understood in positive terms. While Gillespie states that "it took [Asa] Gray years to begin to appreciate the real threat to design contained in natural selection," he introduces Charles Hodge as "one of the most astute writers on the theological implication of Darwin's work" (p. 112). Darwin admitted that the ultimate causes of variability were unknown, thereby not invoking some unknown design but acknowledging the ignorance of what he assumed to be natural causes. Of course, this unknown factor of the cause of variations still threatened the whole idea of natural selection. But Darwin felt there were enough data to support the idea of random variation. Darwin was not oblivious of theology even in his argument against design. He did not want to see God reduced to a capricious or even immoral force as natural selection might sometimes indicate. Gillespie rightly asserts that "the *Origin* was the work of Darwin the theist as well as Darwin the positivist, and the intermingling of positivism and theology in that great work is one of its most fascinating features.... During the twenty years or so in which he worked on his theory and even during the agnostic period of his later life made so familiar by his autobiography, elements of the creationist and positivist epistemes coexisted in Darwin's mind in a loose, paradoxical, and curiously unantagonistic way" (pp. 124-125).

Very early Darwin rejected the idea that God would have created the world in such a way as to make it appear that it had evolved. While for Darwin God was not directly involved in the transformation of the species, still in the 1850s he thought of some sort of initial creation to explain the origin of life. Similarly he thought that God had impressed some general laws upon nature in a creative act. Yet he was unwilling to endorse spontaneous creation publicly. Not the least of his reasons was that he could not resolve how God could be omnipotent and omniscient and at the same time be irrational and even immoral in introducing superfluous laws of nature and waste of life. So "Darwin found God's relation to the world inexplicable" (p. 133).

Darwin's belief in orthodox Christianity vanished slowly, not to a small degree, because of the shortcomings of biblicism in science. But Darwin did not throw out belief in God altogether. He was not interested in a thoroughgoing atheistic philosophical or metaphysical materialism, and he was still a theist when he wrote the *Origin*. Although the dominant tone of his *Autobiography* is agnostic, he still acknowledged in 1879 that his religious beliefs were

constantly shifting and he confessed to Gray in 1860 and to Joseph D. Hooker in 1870 his "hopelessly muddled theology" (p. 142). Gillespie concludes that "Darwin's own approach to evolution fell short of complete positivism" (p. 146). Darwin continued to speculate about the creation of the first form of life and could not abandon the universe to complete meaninglessness, as a total positivistic view of the cosmos entailed. Yet there was a general acceptance of positivism as a tool for his work and as a world view. Gillespie sums up his investigation by saying that Darwin's "life is a model of how one episteme displaces another" (p. 156).

In his careful study Gillespie convincingly shows that Darwin's approach to the relationship of science and religion is much more complex than we often assume. Unfortunately we do not hear anything about Darwin's faith. Was Darwin ever a practicing Christian who was gradually edged out of his orthodoxy through his scientific observations, or did he already come from a nominally Christian background? We witness the immense struggle in him to maintain meaningful life and still accept the facts of science as natural phenomena. Although Gillespie continually refers to other leading naturalists of his time, he does not emphasize that many of them did not become as skeptical or helpless in relating religion and science.

It is true that during Darwin's time a gradual shift from creationism to positivism did take place. But the question must be asked whether this was really a replacement of one by the other or whether positivism became the dominant stream while creationism was largely submerged. The issues with which Darwin wrestled—omniscience and foreknowledge or chance and necessity—are still with us today. They are classical questions which humanity has always posed (cf. Augustine) and which, depending on our understanding of nature and its processes, will be perceived differently with each generation. There is one final observation. When Gillespie states that Hodge perceptively sensed the implications of Darwin's theory, we wonder at least. Hodge maligned Darwin as nobody else in North America did, even to the point of misquoting him. He evidently was afraid that Darwinism in America might slide into the same atheistic materialistic path as it had been doing in Germany. Yet he did not realize that Americans, such as Gray, had an almost natural inclination to interpret Darwinism theistically. One might wonder whether Darwin would not have perceived the problem of creation in decidedly theistic terms had he grown up in the vibrant religiosity of North America instead of the cool climate of the British state religion.

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Creativity and God: A Challenge to Process Theology. By ROBERT C. NEVILLE. New York: Seabury Press, 1980. 163 pages. $12.95.

In recent years process theology not only has become one of the major theological options in North America but also is making an impact in Europe. One of the strengths of the process perspective is its unified cosmological scheme in terms of which both God and the natural world are described by

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using the same philosophical categories. For this reason process thought has been very attractive to those persons who seek to integrate science and religion and overcome the fragmentation of modern culture. As its title suggests, Robert C. Neville's most recent book offers a critique of Whiteheadian process theology by challenging the religious and philosophical adequacy of its conception of God.

Neville's critique is particularly challenging because Neville takes a standpoint which affirms, in general, Whitehead's cosmological scheme. Too often criticisms against process thought are brought from the outside by persons who do not have an adequate command of the complexities of the system. Neville, however, stands as one inside, immersed in the system, but rejecting it at crucial points. In his first book, *God the Creator* (Chicago: University of Chicago Press, 1968), Neville developed his own view of God. In *Creativity and God* he uses that perspective to evaluate process theology through examination of its major expounders.

Neville argues that the distinction drawn between God and creativity in process theology is both philosophically and religiously inadequate. He prefers an ontological theory of creation *ex nihilo*. In his perspective "God is the creator of everything determinate, creator of things actual as well as of things possible" (p. 8). God exercises ontological creativity which is not shared by his creatures or explained by created categories (p. 140). Consequently Neville rejects the process position that both God and the world may be subsumed under the same philosophical categories. He challenges the religious adequacy of process theism as well. Whereas process theologians, for example, account for evil as a product of human freedom which limits God's power, Neville believes that God is the creator of both darkness and light. He is sensitive to the terror of God as well as God's love and care. In the end his evaluation of the philosophical adequacy or inadequacy of process theology is integrally related to his own religious experience and sensitivity. His perspective is informed by the experience of God as total presence in all things sacred and profane.

The basic task of Neville's book is not to articulate his alternative to process theism but rather to provide a sustained critique of various representatives within the process tradition: Lewis Ford (chaps. 1-2), Charles Hartshorne (chap. 4), Shubert Ogden (chap. 5), Charles Winquist (chap. 6), and John B. Cobb, Jr. (chap. 7). The content of these critiques is controlled by the concerns of the theists being examined, and all critiques are equally superb in their clarity, cogent analysis, and sensitivity to the central problems in each position. These chapters may be read independently and provide excellent study resources in courses dealing with process thought.

There are two major drawbacks to the book. First, because the text is designed to engage process theologians in dialogue, Neville assumes that the reader is familiar with the categories and concepts of process thought. This limits the usefulness of the book for persons outside the process-theology circle. Second, several of the chapters are revisions of previously published articles and are therefore somewhat dated. This is particularly problematic in the chapter on Cobb dealing with world religions. Neville fails to take account of Cobb's most recent book on that subject, *Christ in a Pluralistic Age* (Philadelphia: Westminster Press, 1975).

While Neville is not concerned with issues in science and religion, his critique of the adequacy of the process doctrine of God challenges any perspective which seeks to integrate science and religion on a common metaphysical foundation. The viability and implications of his critique will be worked out as

his dialogue which process theology continues. A recent issue of *Process Studies* (10 [Fall-Winter 1980]: 93-109) with critiques of Neville's book is evidence that process theologians have listened closely to his challenge. It is important that the process cosmological scheme be taken seriously by persons who do not share completely the process theological perspective. This is a sign of the theological maturity of the process tradition. Neville's various books are excellent examples of the use of Whitehead's cosmology in new contexts.

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Creation and the World of Science. By A. R. PEACOCKE. New York: Oxford University Press, 1979. 389 pages. $19.95.

The most comprehensive and demanding exercise which A. R. Peacocke, a Cambridge physical biochemist well versed in Christian theology, attempts here is to reconceive for our times the main sweep of the doctrine of creation, a neglected if not eclipsed teaching. Such an exercise requires powerful biblical exposition, careful study of the long history of creation belief, facing the full welter of contemporary experience, and a consideration of modern natural science. Peacocke focuses with boldness and determination on the last of these tasks.

In the main he argues that an accounting of the major natural sciences today can lead to an enriched and more significant doctrine of creation. The treble of this argument is accompanied by a "ground bass," that is, classical belief in creation by the Father, Son, and Holy Spirit as found in the Book of Common Prayer. In brief, Peacocke's composition is a broad-scale synthesis of the natural sciences and natural theology pursued as the articulation of faith. It stands in a venerable Anglican tradition of reconciling science and theology.

With his "beginning point" that our world is best understood by the natural sciences, Peacocke's initial gambit is to register the immensity of the universe, and even potential universes, according to current astrophysics. Against an existentialist view of man as a surd in a foreign universe, he contends that it is no less immense, more wonderful, and intelligibly engaging that out of the very stuff of mutually relative space-time-matter-energy matrices conscious humanity emerges. In unfolding this contention, Peacocke holds that the open-ended and evolving systems of nature described in twentieth-century cosmology, quantum physics, and not least recent theoretical biology call for a thoroughgoing theological reintroduction of continuous creation. This is compatible with biblical faith's center of universal dependence upon the Creator and supported by cosmic, organic, and human development featuring continuity and emergence at all levels of evolution.

Turning to a consideration of life, conceived as the "life game" and understood according to the most recent developments in biology and thermodynamics, Peacocke claims that the interplay of chance and law at the distinct levels of mutations and the consequences of molecular events is more subtle and intertwined than Jacques Monod allowed. Following I. Prigogine and M. Eigen, Peacocke finds chance and law jointly "creative" in the emergence and evolution of life. Yet he is forthright in affirming chance

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throughout nature. Far from problematic for the Creator, "chance is the search radar of God, sweeping through all possible targets available to its probing." Additional metaphors of God's activity in creation are proposed, such as dance, music, and play. Like a great composer, God unfolds the potentialities of creation.

Upon a closer examination of man, Peacocke argues that our mental activities are genuinely emergent within nature's hierarchies. Also affirming a "qualified mind-body identist" position—paralleled by the biblical view of man as a psychosomatic unity—he holds that the distinct hierarchies of natural systems allow the model of the "self as agent." Arguing against both an outdated traditional dualism of the material and mental and an unnecessary thoroughgoing panpsychism, he further holds that the "near paradox" of self-emergence is parallel to God's relation to the world, in turn analogous to the self-body relationship. Qualifying this analogy for God's transcendence, Peacocke further distinguishes his view of the self from process theism's embrace of the built-in self-creativity of all occasions, which, he contends, diminishes the Creator's work to influence. However, Peacocke also embraces a spatial idea of panentheism—God in the world and the world within God—which he fleshes out with a preferred biological model of human procreation. He puts the neglected side of this necessarily bisexual model in terms of "God creating the world within herself."

To this halfway point Peacocke's argument calls for theological revision in the light of the sciences. Under a transitional chapter, "The Selfish Gene and What Men Live By," he holds that with man "evolution becomes history," that is, there is a "unique transition" in the "emergence of man," not to be downplayed by the reductive tendency of Wilson's sociobiology. Humans as persons require others for personhood, and all are beset by great problems of meaning concerning death, suffering, hope, and how to live. Further, the more our sciences increase understanding of the dominant features of cosmic and biological evolution that results in man, the more acute our distinctively human questions become. For example, the systematic selfishness of genes bent on survival, the prerequisite that old organisms must die for new ones to appear, and the open-ended, that is, not strictly predictable, character of evolution as a whole (best called "exploration"), accentuate the questions of death and what to live by. The stage is set for reasoning more explicitly from theology to human concerns.

The remainder of the book seeks to show how the doctrine of creation—appropriately revised—helps meet our difficulties. In a chapter, "Evolved Man and God Incarnate," Peacocke notes on revised biblical grounds that we sin by failing to realize our potential. Correspondingly the Creator must risk and suffer in creation. Moreover, since God variously discloses meaning through his explorations and compositions at each of many different levels of nature, the author "conjectures" that God can convey meaning in a person. Jesus can reveal God's intentions in his openness to God and open-ended way in creation. Death, the author affirms, becomes the "opportunity of a new kind of existence, emergent from its matrix of space-time-matter-energy." Furthermore, on the conduct of "man in creation," Peacocke surveys our life in natural ecosystems threatened by burgeoning population and technology. Sensitive to nature as a sacramental expression of God's ways, the author envisions human dominion on the model of a stewardly caretaker, a role in which man in symbiosis with nature is a kind of priest. Congruent with his view of the Creator as explorer, he stresses man's role as cocreator and coexplorer, an interpreter and fellow sufferer who offers his work to God.

Peacocke concludes with the necessity of "creation and hope." He contrasts the severely apocalyptic—and thermodynamic—prospects of earthly and universal disintegration with a biblical interpretation of Beginning and End at the boundaries of time. Ultimately then our hope is in God. However, with respect to our future *on* earth—in distinction from the future *of* earth—he calls for human cocreation with God, which must become a way of the Cross given a world with a terminus ad quem.

One hesitation I have about the author's representation of the whole gamut of the sciences is whether he has over played the significance of biology. He may give too much preference to its language at the danger of covering over that of other disciplines, for example, ecology, which at times seems added on, and psychology. Peacocke uses the concept of emergence to understand the origin of life and man, the terribly human question of death, and even the incarnation. At a stretch this may afford biological clarity, but it surely levels out these jagged events. Probably more serious is the relative neglect of the social sciences, even though his critique of reduction in sociobiology is well grounded. In any case, Peacocke's lucid and careful description of current natural sciences, particularly biological disciplines and their more or less valid extensions, makes his book specially valuable.

Theologically Peacocke's suggestions for thinking of the Creator are admirably forthright, and some, for example, God as composer, are downright promising. Whether they could survive examination against the turbulent history of many theologies of creation is another question. In any case, three related points give me pause. It is difficult to build trust in the Creator's love in face of his risk and suffering, particularly since the power of that love is not strongly voiced. Also, given Peacocke's grand view of all evolution as exploration, his theology of God as explorer seems underdeveloped; and process theologians might well find its logic more akin to the idea of a developing God than Peacocke allows. Finally the absoluteness of beginning does not receive theological expression to match the author's vigorous argument for continuous creation. The power of the Creator needs more attention.

Distinct from these issues is that of the quality of Peacocke's synthesis as a whole. It is clearly accessible, a rare quality among syntheses. Less historical, but bolder scientifically than Charles Raven's work, it is not as speculative as Pierre Teilhard de Chardin's. Building upon Michael Polanyi's work and that of numerous *Zygon* authors, Peacocke's work compares well to the otherwise broader and more sophisticated syntheses of process thought in its engagement of current biological reflection and concern for survival. Despite its neglect of synthetic currents in Thomism and Calvinism, this is an important and up-to-date synthesis of natural science and theology.

Nevertheless it is one sided. This appears in the insufficiently argued working assumption that our world is best understood by the natural sciences. The alleged superiority and dominance of our scientific understanding needs to be thoroughly argued vis-à-vis the power of historical world understanding—to say little of technological, as distinct from scientific, world views. Apart from this Peacocke's enriched imagery of the priestly role of man (!) in creation will not receive the systematic social and political scrutiny which it requires and which the author fails to provide. If we are called to a universal priesthood of creation, and in search of justice both ecological and social, we need to know the strengths of priestly politics. Yet the onesidedness of this synthesis works against the roots of such understanding. Broaching the subject in his historical introduction, he quickly pulls back from the "acids" of sociology of knowledge. Issues of this order are fairly

pressing here. This of course does not mean that standard critical questions of syntheses (e.g., whether natural science and a theology of creation, respectively, require each other) should not be pursued. They should. Also Peacocke's project of a "natural theology" that is largely Christian needs rigorous examination. But Peacocke is aware of and accepts much of the strain of beginning at both the natural scientific and theological end of things. This is why the question of unity here needs more attention.

As keenly aware of increasing divergence, as well as convergence, between the most intelligible outcomes of science and theology, Peacocke nevertheless joins these disciplines without the usual reliance upon either metaphysics or extended epistemological structures. Among syntheses this is rare. How has Peacocke managed this? A surprising part of the answer lies in the unifying role of music indicated in his work. Methodologically his theological and scientific inquiries appear as bass and treble clefs of argument. Correspondingly he likens the process of creation to the playing out of a complicated fugue, and the Creator to its composer.

Such music is not merely metaphorical. I find that the author's invocation of all creation as musical taps into its extraordinary power and mystery. After all the Bible opens (Gen. 1) with a majestically imposing liturgy of God's creation of the cosmos and humankind. This piece resounds with song upon oral recitation. Moreover, Genesis 1 is replayed in a new and more personal key as the prologue to John's Gospel, and its chords strengthen the finale of new heaven and earth anticipated in the Apocalypse. Indeed Genesis 1, like the great creation Psalms, is musical in the elementally powerful sense of delivering its goods immediately. Creation gives as well as elicits confidence. It establishes as well as affords order. Historically, Peacocke rightly sees this in the advent of modern natural science. Aesthetically it is also manifest in countless works, from the lofty hymns of Isaac Watts and Charles Wesley to the severity of nature as creation in Annie Dillard's *Pilgrim at Tinker Creek*.

However, despite this sort of promise, it is not clear that Peacocke's view of the musical reality of all creation has been played and worked out sufficiently. This is due in part to the composition of the book, in which the chapters which stress the treble of argument from science to theology exceed those which allow the bass of argument from theology to science. More seriously, and upon receiving the whole book as an "exercise," there is a deeper sense in which music is prior to (any) argument. This is evident throughout in the author's fine celebration of natural science but far less conspicuous in his theology—especially in his labored conjectures on the centrality of incarnation, surely the least musical (and least cogent) move in the book. Finally, at the extremely demanding level of really joining music and argument, Peacocke has given us as much reason to suppose both that the entire creation is improvisation as it is a Bach-like fugue, and that the Creator is as much an explorer as a composer. This does not stop the music, but it does call for a more adequate song. Musically Peacocke's bold work lacks balance and accomplishment even though it is fresh with promise.

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Physics and Philosophy: Selected Essays. By HENRY MARGENAU. Dordrecht: D. Reidel Publishing Co., 1978. 404 pages. $39.50.

Henry Margenau is the outstanding physicist-philosopher of the present day and any collection of his many contributions to the philosophy of physics and the impact of physics on philosophy is an important undertaking. This volume is the sixth in the *Episteme* series edited by Mario Bunge of McGill University drawing together "the foundational, methodological, philosophical, psychological, sociological, and political aspects of the sciences, pure and applied."

Margenau's selected papers are grouped into four sections: "metascience, philosophical analysis of scientific truth," dealing with the methodology of science; "fundamental problems of twentieth-century physics," discussing the philosophical implications of quantum theory; "science and human affairs," treating science as a cultural phenomenon; and a section on science and ethics.

As might be expected from one of our leading theoretical physicists, papers in the first two sections require a thorough background in the mathematical subtleties of wave and quantum mechanics. The editorial selection is somewhat limited but the reader who is stimulated to follow Margenau's continuing effort to unify the epistemology of science will find guidance in the included list of publications.

Many of the author's early contributions to the philosophy of science do appear in these sections. During the years when the positivists were most vigorous, Margenau argued persuasively that physics has metaphysical presuppositions. He explained the philosophy of Pauli's exclusion principle when this was much misunderstood, and he showed that quantum mechanics could be simplified by eliminating von Neumann's projection postulate. However, Margenau still continues to be a stimulating and dynamic force in present-day philosophy of natural science, and it is disappointing that a collection published in 1978 does not reflect his more recent contributions.

Of particular interest to readers of *Zygon* are his many papers emphasizing his commitment to the need for a scientific approach to value theory and ethics. In this volume the last 150 pages are devoted to this area. Papers include "Western Culture, Scientific Method and the Problems of Ethics," "Science and Human Affairs," "Physics and Ontology," "Faith and Physics," "Quantum Mechanics and Consciousness," and "Religious Doctrine and Natural Science."

In part 3 Margenau asks the question: Can the epistemology of exact science be applied to human interactions as they appear in sociology, ethics, and history? He first affirms the belief that ethics is a verifiable discipline and that its formal structure should be that of science. He then turns to man and his physical environment. In a historical review he characterizes as old-fashioned mechanistic materialism, empiricism, logical positivism, and existentialism and points to the rise of nonmechanistic science. He concludes that "modern science releases man from his restrictive role as a spectator in a universe that is quite complete and objective without him. He has become an active participant in the drama of existence."

The last part of the collection presents Margenau's discussion of various philosophical issues of concern at the various times the articles were written.

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Although of considerable historical interest, they do not deal with problems of primary importance to philosophers of science at the present time. One exception to this general statement is the paper entitled "Metaethics," a good precursor to Margenau's *Ethics and Science* (Princeton, N.J.: D. Van Nostrand Co., 1964). This is well worth the attention of our present-day philosophers of science.

The final essay is entitled "Religious Doctrine and Natural Science." Building directly on his full treatment on the nature of physical reality in his book by the same name (New York: McGraw-Hill Book Co., 1950), Margenau discusses the meaning of existence in science and then shows religion as a part of an enlarged science, introducing his final arguments with: "My fondest hope lies in the direction of amalgamating religion with science." He somewhat tentatively embraces William James's suggestion that the body of religious beliefs is a doctrine capable of pragmatic verification.

As a collection of essays, this book offers nothing new from Margenau's fertile pen. I would have liked to see included some of his newer publications because the present editorial selection does not do justice to the range of Margenau's contribution to the philosophy of science. On the other hand it does bring together in one place papers that are widely distributed through the literature. Also the complete bibliography of Margenau's 240 published contributions to physics and philosophy (up to 1977) is a good place to start for anyone interested in the philosophy of this remarkable man of science.

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Biblical Games: A Strategic Analysis of Stories in the Old Testament. By STEVEN J. BRAMS. Cambridge, Mass.: M.I.T. Press, 1980. 196 pages. $15.00.

This surely must be one of the most unusual exegeses of the Old Testament that have been attempted. Steven Brams analyzes a large number of Old Testament stories by using the mathematical theory of games to see (1) if the stories are sufficiently rational and logical to be treated by game theory (they are) and (2) to conclude whether the players have maximized their options by their decisions during the course of the episode.

To do this Brams must make some basic assumptions about the goals and motivations of the game players. These assumptions are quite obvious for the humans and somewhat unconventional for God, although it must be pointed out that his assumptions for God's rationales lead to God always winning. These assumptions (which are not original with Brams) are that God created the world for his own glory, and he created man so that he would have someone to admire him and his works. One of the important corollaries of these assumptions is that God created man with the power of free will, even to the point of invoking God's wrath, so that man's freedom of choices gives substance to his game playing. Thus when God wins it is to his greater glory.

In setting up the strategy for applying game theory, the author carefully explains and illustrates the "game tree" and "matrix" forms of analysis. He is so clear that even the least mathematically inclined of his readers will have

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little difficulty in learning the necessary steps to follow such procedures themselves if they so desire. Brams does not try to analyze all the Old Testament stories, and the persuasiveness of his presentation will stimulate many of his readers to try their hand, as I did, at applying his game-theoretic analysis to some of the stories he did not use. The author's choice was for well-known stories that involved significant conflict and intrigue where the players could be assumed to think about the consequences of alternative actions before choosing them. Most of the stories involve God directly, although in some cases God's game was played through a human intermediary.

Brams illustrates with games matrices and game trees the stories chosen for analysis: under the title "The Meaning of Faith" Adam and Eve, Abraham and Isaac, Jephthah's daughter; under "Family Conflict" Cain and Abel, Jacob and Esau, Joseph and his brothers; under "Protracted Conflict" Moses and the Israelites; under "Just Agreements and Wise Arbitration" Rahab and the Spies, Joshua's deception by the Gideonites, Solomon's wisdom; under "Royal Conflict" Saul's tenuous position, conflict with David, Esther's intercession; under "Conflict Between the Sexes" Nabal, Abigail, and David, Samson's revenge, the cashiering of Queen Vashti.

Many of these stories are chosen to illustrate the methodology and some of them are complicated enough to require a whole series of episodic analyses, particularly Moses and the Israelites, taking Moses from Egypt to the Promised Land with many events along the way. The more complicated stories, though good illustrations of the game-theoretic analysis, do not highlight the theological content of the whole procedure as clearly as the direct games played between humans and God. These I found to be the most stimulating. God always won, though not as an absolute dictator but usually with his next-best solution to the conflict, with man also maximizing his final position and seldom totally defeated.

As previously noted, Brams writes in such a stimulating style that the reader finds himself wanting to try the game-theory technique on some of his own favorite Biblical tales. That certainly was my reaction, and I constructed game matrices and game trees for the stories of Barak, Deborah, and Sisera; Gideon and the Midianites; and Saul and the witch of Endor. As in the cases of Brams's games, God won, although in the case of Saul and the witch, he was totally defeated.

This process can shed new light on the stories we know so well by emphasizing the point that the stories' outcome was carefully designed for the greatest glory of God. This kind of analysis highlights one facet of Old Testament stories which may not be generally recognized: Even small changes in the details of the stories may decrease their impact as illustrations of the glory of God.

I demonstrated this to myself by redoing the game-theoretic for the story of Jephthah's daughter using George Frederick Handel's modification of the Biblical story. Handel worried about the acceptance of his oratorio Jephthah by mid-eighteenth-century audiences if the libretto showed such a cruel father as to sacrifice his only child, his beloved daughter. So Handel changed the ending by having an angel of the Lord appear at the last minute, saving Jephthah's daughter's life and transmuting her sentence to life-long celibacy. I constructed the game plan for this modification, and, contrary to all of the legitimate Bible stories, in Handel's Jephthah, God loses!

There is, however, a more significant message in Brams's analysis of Biblical stories than just the usefulness of game theory to study the Old Testament. To apply this technique, human emotions are applied to the players, and

when God is one of the players the picture of him is far from classical. Though endowed with all kinds of magical and supernatural powers and though omnipresent, he is not omnipotent. Capable of setting up the games he wishes to play, he is rational but not emotionless. God does not always get his own way, and when he does not, he may be angry, jealous, and vengeful. Despite his awe-inspiring powers, God is a very human character. It is difficult to escape the feeling that the God who fits the game-theoretic is a man-made God, a God endowed with supernatural powers but with human motivations and designs accurately reflecting the emotions of those who incorporated these stories of strife and travail into the substance of the Old Testament.

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